

## VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a **Major, Municipal** permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et.seq. The discharge results from the operation of a 4.0 MGD secondary activated sludge WWTP consisting of: Raven/Doran Sewage Lift Station, main pump station, split flow influent channel with mechanical screen/manual bar rack, dual aerated grit chamber and cyclone, dual primary circular clarifiers, three train complete mix aeration basins (with alkalinity adjustment provided by lime feed, aeration and mixing with multiple two-speed surface aerators), dual secondary circular clarifiers (with secondary sludge recycle to the aeration basins), two ultraviolet disinfection units in series, dual post aeration units utilizing diffused aeration, indicating/totalizing ultrasonic flow meter with Parshall flume, effluent pump station, and emergency power generator.

The sludge treatment scheme consists of: Gravity thickening unit, two-stage anaerobic digesters both equipped with heating and mixing systems, sludge holding tank, belt filter press, drying bed, covered building for stockpiling sludge, and a septage receiving facility. Digester supernatant is dosed with lime and ferric chloride to precipitate solids into a settling basin. Final sludge disposal is discussed in item 10 below.

This permit action consists of limiting pH, BOD<sub>5</sub>, suspended solids, total residual chlorine and ammonia nitrogen, E.coli and dissolved oxygen; including special conditions regarding sewage sludge use and disposal, compliance reporting, control of significant dischargers, whole effluent toxicity testing, and other requirements and special conditions.

SIC Code: 4952

1. Facility Name and Location:  
**Richlands Regional Wastewater Treatment Facility**  
425 Plant Road, adjacent to Old Richlands Airport  
Richlands, VA 24641
2. Permit No. VA0021199  
Existing Permit Effective Date: August 25, 2007  
Existing Permit Expiration Date: August 24, 2012
3. Owner Name and Address:  
**Town of Richlands**  
200 Washington Square  
Richlands, VA 24641  
Owner Contact:  
Name: Timothy Taylor  
Title: Town Manager  
Telephone No.: 276-964-2569  
  
Facility Contact:  
Name: Dave Fields  
Title: WWTP Superintendent  
Telephone No: 276-964-2566
4. Application Complete Date: 03/29/2012  
Permit Drafted By: Fred M. Wyatt, SWRO Date: March 1, 2012  
Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_

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Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_  
Public Comment Period Dates: \_\_\_\_\_ to \_\_\_\_\_

5. Receiving Stream Name: Clinch River; River Mile: 6BCLN317.45 River  
Basin: Tennessee-Big Sandy River; Subbasin: Clinch River; Section: 2;  
Class: IV; Special Standards: None. Lat.: 37°05'29"; Long.: 81°49'57"

7-Day, 10-Year Low Flow (7Q10): 10.87 MGD (June - Nov.)

1-Day, 10-Year Low Flow (1Q10): 7.63 MGD (June - Nov.)

7Q10 High Flow: 19.00 MGD (Dec. - May)

1Q10 High Flow: 13.83 MGD (Dec. - May)

30-Day, 10-Year Low Flow (30Q10): 14.7 MGD

30Q10 High Flow: 30.2 MGD

Harmonic Mean Flow (HM): 49.65 MGD

Tidal? NO

On 303(d) list? Yes (See Item # 13 below)

6. Operator License Requirements: Class II
7. Reliability Class: III
8. Permit Characterization:  
( ) Private ( ) Federal ( ) State (X) POTW ( ) PVOTW  
( ) Possible Interstate Effect ( ) Interim Limits in Other Document
9. Attach a schematic of wastewater treatment system, and provide a general description of the activities of the facility.

Discharge Description

OUTFALL NUMBER	DISCHARGE SOURCE (1)	TREATMENT (2)	FLOW (3)
001	Town of Richlands, Town of Cedar Bluff, & Tazewell Co.	See Page 1 above, first paragraph	4.00 MGD

- (1) List operations contributing to flow (2) List treatment units  
(3) Design flow

10. Sewage Sludge Use or Disposal: The sludge disposal plan consists of transporting the stabilized and dewatered sludge to the Tazewell County Landfill.
11. Discharge Location Description: See attached Richlands, VA Quadrangle; Number: 087-D
12. Material Storage: None reported
13. Ambient Water Quality Information: The 2010 303(D) Report lists Clinch River as impaired from the raw water intake just upstream of the Town

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Hill Creek confluence downstream to the Mill Creek confluence, river mile 321.31 to 316.53. The segment is not supporting the recreation and fish consumption use goals. The impairments are listed as total fecal coliform and E.coli; and mercury in fish tissue. A WQM station at 6BCLN315.11 had 25% (3 of 12) of samples that exceeded the water quality standard. Fish samples collected in 2007 included three that exceeded the DEQ screening value for mercury. The report attributes the bacterial violations sources to urban runoff/storm sewers and rural (residential areas). The mercury source is unknown. The bacterial TMDL was approved by EPA on 11/10/2011. The mercury TMDL is scheduled for 2022.

14. Antidegradation Review & Comments: Tier I (X) Tier II ( ) Tier III ( )

The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with a Tier determination. The receiving stream is Tier I, since the original effluent limitations were based on water quality standards.

15. Site Inspection: Technical inspection was conducted on January 11, 2011 by Wade Carico, DEQ-SWRO.

16. Effluent Screening & Limitation Development:

Since the receiving stream flows have not significantly changed since the previous reissuance, effluent limitations are not being reevaluated in this reissuance.

**TMP** - During the previous permit cycle, the permittee completed and passed five annual chronic whole effluent toxicity tests. The chronic tests were static renewal tests using C. dubia and Pimephales promelas. The chronic C. dubia was a 3-brood survival and reproduction test and the chronic P. promelas test was a 7-day larval survival and growth test.

An evaluation of the data indicates that no limit is needed for the next permit cycle, and that the permittee should continue with annual, chronic monitoring. Updated special condition language has been included in the reissuance permit. A summary of the whole effluent monitoring results and WETLIM10.xls spreadsheet are attached.

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**Disinfection:** On January 15, 2003, new bacteria standards in 9 VAC 25-260-170.A became effective, as did the revised disinfection policy of 9 VAC 25-260-170.B. These standards replaced the existing fecal coliform standard and disinfection policy of 9 VAC 25-160-170. E.coli (fresh water) and enterococci (saltwater and transition zone) criteria replaced the existing fecal coliform criteria. Since this facility disinfects with ultraviolet radiation, the previous permit contained fecal coliform limits. These limits were retained in PART I.A. of the previous reissuance and remained in effect during a demonstration period (beginning 6 months from the permit effective date) during which a minimum of three samples per week (grab sample taken between 10:00 a.m. and 4:00 p.m.) was analyzed for E.coli.

These samples were collected between August 1 and September 5, for a total of 16 samples. The geometric mean for each month was compared to 126 colonies/100ml for compliance with the WQS. The data indicated that the facility can consistently meet the standard. On December 1, 2007, the final E.coli effluent limitations became effective. PART I.B. Special Condition - Bacterial Effluent Limitations and Monitoring Requirements - Additional Instructions, has been deleted in this reissuance permit, since the permittee has completed the Fecal coliform/E.coli study. As a result, Part I.A. of the reissuance permit has effluent limitations and monitoring requirements for E.coli, instead of Fecal coliform.

**Basis for Effluent Limitations: 4.0 MGD Design Flow**

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow	NA	NL	NA	NA	NL	Continuous	Totalizing Indicating & Recording
PH	2	NA	NA	6.0 SU	9.0 SU	1/Day	Grab
BOD <sub>5</sub> (June -Nov)	1, 5	18 mg/l 270 kg/d	27 mg/l 410 kg/d	NA	NA	1 Day/Wk.	24 Hour Composite
BOD <sub>5</sub> (Dec. -May)	1, 5	30 mg/l 450 kg/d	45 mg/l 680 kg/d	NA	NA	1 Day/Wk.	24 Hour Composite
Total Suspended Solids	1	30 mg/l 450 kg/d	45 mg/l 680 kg/d	NA	NA	1 Day/Wk.	24 Hour Composite
Ammonia Nitrogen (June-Nov.)	2, 5	3.6 mg/l	3.6 mg/l	NA	NA	1 Day/Wk.	24 Hour Composite
Ammonia Nitrogen (Dec.- May)	2, 5	7.3 mg/l	7.3 mg/l	NA	NA	1 Day/Wk.	24 Hour Composite
E.coli (n/100 ml)	2	126 **	NA	NA	NA	1 Day/Wk***	Grab
Dissolved Oxygen	2, 5	NA	NA	6.2	NA	1/Day	Grab

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- \*1. Federal Effluent guidelines
- 2. Water Quality-based Limits:
- 3. Best Engineering Judgement
- 4. Best Professional Judgement
- 5. Other (e.g. wasteload allocation model)

\*\*Geometric Mean

\*\*\*Between 10 a.m and 4 p.m.

- 17. Basis for Sludge Use & Disposal Requirements : The VPDES Permit Regulation (9 VAC 25-31-10 et seq.), adopted by the State Water Control Board May 22, 1996, became effective on July 24, 1996. Among other program changes, the newly adopted regulation incorporated technical standards for the use or disposal of sewage sludge.
- 18. Antibacksliding Statement: Since no effluent limitations are being relaxed in this reissuance, the antibacksliding provisions of the Permit Regulation (9 VAC 25-31-220.1) do not apply.
- 19. Compliance Schedule: NA.
- 20. Special Conditions:

**PART I.B. Special Condition - Compliance Reporting**

**Rationale:** Authorized by VPDES Permit Regulation, 9VAC25-31-190J4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

**PART I.C. Special Condition - Control of Significant Dischargers**

**Rationale:** VPDES Permit Regulation, 9VAC25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to meet specified regulations.

**PART I.D. Special Condition - Whole Effluent Toxicity Testing**

**Rationale:** VPDES Permit Regulation, 9 VAC25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.

**PART E. Other Requirements and Special Conditions:**

**1. 95% Capacity Reopener**

**Rationale:** Required by VPDES Permit Regulation, 9VAC25-31-200 B 4 for all POTW and PVOTW permits

**2. Indirect Dischargers**

**Rationale:** Required by VPDES Permit Regulation, 9VAC25-31-200 B 1 and B 2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

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**3. CTC, CTO Requirement**

**Rationale:** Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790.

**4. Operation and Maintenance Manual Requirement**

**Rationale:** Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190 E.

**5. Licensed Operator Requirement**

**Rationale:** The VPDES Permit Regulation, 9VAC25-31-200 C and the Code of Virginia § 54.1-2300 et seq, Rules and Regulations for Waterworks and Wastewater Works Operators (18VAC160-20-10 et seq.), require licensure of operators.

**6. Reliability Class**

**Rationale:** Required by the Sewage Collection and Treatment Regulations, 9VAC25-790 for all municipal facilities.

**7. Treatment Works Closure Plan**

**Rationale:** State Water Control Law § 62.1-44.19. This condition is used to notify the owner of the need for a closure plan where a treatment works is being replaced or is expected to close.

**8. Section 303(d) List (TMDL) Reopener**

**Rationale:** Section 303(d) of the Clean Water Act requires the total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it in compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in the permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

**9. Sludge Reopener**

**Rationale:** Required by VPDES Permit Regulation, 9VAC25-31-220 C for all permits issued to treatment works treating domestic sewage.

**10. Sludge Use and Disposal**

**Rationale:** VPDES Permit Regulation, 9VAC25-31-100 P; 220 B.2.; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

**11. Reduced Monitoring**

**Rationale:** EPA published "Interim Guidance for Performance -Based Reduction of NPDES Permit Monitoring Frequencies" (EPA 833-B-96-001) in April, 1996. Permittees are granted a reduction in monitoring frequency based on a history of permit compliance.

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**PART II, Conditions Applicable to All Permits**

**Rationale:** VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes from the previous permit contained in the reissuance permit:

PART I.B. Special Condition - Bacterial Effluent Limitations and Monitoring Requirements - Additional Instructions, has been deleted, since the facility is now meeting final E.coli effluent limitations.

The permittee has requested that the land application option not be included in the reissuance permit. Therefore, biosolids/soil limitations and monitoring requirements are not included. The special conditions for biosolids land application, reporting and storage, etc are also not included.

During the previous permit cycle, the permittee completed a water quality criteria scan, as required in Part I.F.8. and Attachment A. Since no water quality violations were detected, this scan is not being included in the reissuance permit.

The permit requirements and special conditions have been updated, including the special condition for Whole Effluent Monitoring (Toxics Monitoring Program).

Due to no effluent limits violations during the previous permit cycle, the treatment facility continues to qualify for reduced monitoring under EPA's Interim Guidance for Performance Based Reductions of NPDES Permit Monitoring Frequencies.

22. Variances/Alternate Limits or Conditions: None

23. Regulation of Users: 9 VAC 25-31-280 B 9 - NA

Public Notice Information required by 9 VAC 25-31-280 B:

All pertinent information is on file and may be inspected, and copied by contacting Fred M. Wyatt, Department of Environmental Quality, Southwest Regional Office, 355-A Deadmore Street, Abingdon, VA 24210. Telephone: (276) 676-4810 E-mail: [frederick.wyatt@deq.virginia.gov](mailto:frederick.wyatt@deq.virginia.gov)

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a

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brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may review the draft permit and application at the DEQ Southwest Regional Office by appointment.

25. Additional Comments:

Previous Board Action: None

Staff Comments:

*Permit History:* VPDES Permit No. VA0021199 for this facility was issued on December 27, 1974; was reissued on July 1, 1976; August 24, 1983; August 25, 1987; August 24, 1992; August 24, 1997; August 25, 2002; and August 25, 2007 with an expiration date of August 24, 2012.

*Permit Fee:* A permit fee is not required. Only an annual maintenance fee of \$8,292 is required, to be paid by October 1 of each year.

*Threatened or Endangered Species:* According to the attached printout from the Virginia Fish and Wildlife Information Service (VaFWIS), this section of Clinch River is Federal and State T&E Waters. See attached list from VaFWIS. Since this facility is on the list for T&E Coordination with the Virginia Department of Game and Inland Fisheries (DGIF) and the Department of Conservation and Recreation (DCR), the T&E Coordination Form was sent to these agencies.

Public Comments:

26. TMDL: See Item # 13 above.

PLANNING CONCURRENCE FOR MUNICIPAL VPDES PERMIT

PERMIT NO. VA0021199

FACILITY: Richlands WWTP

COUNTY: Tazewell

- ☐ 1. The discharge is in conformance with the existing planning documents for the area.
- ☐ 2. The discharge is not addressed in any planning document but will be included, if required, when the plan is updated.
- ☐ 3. Other

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Environmental Manager

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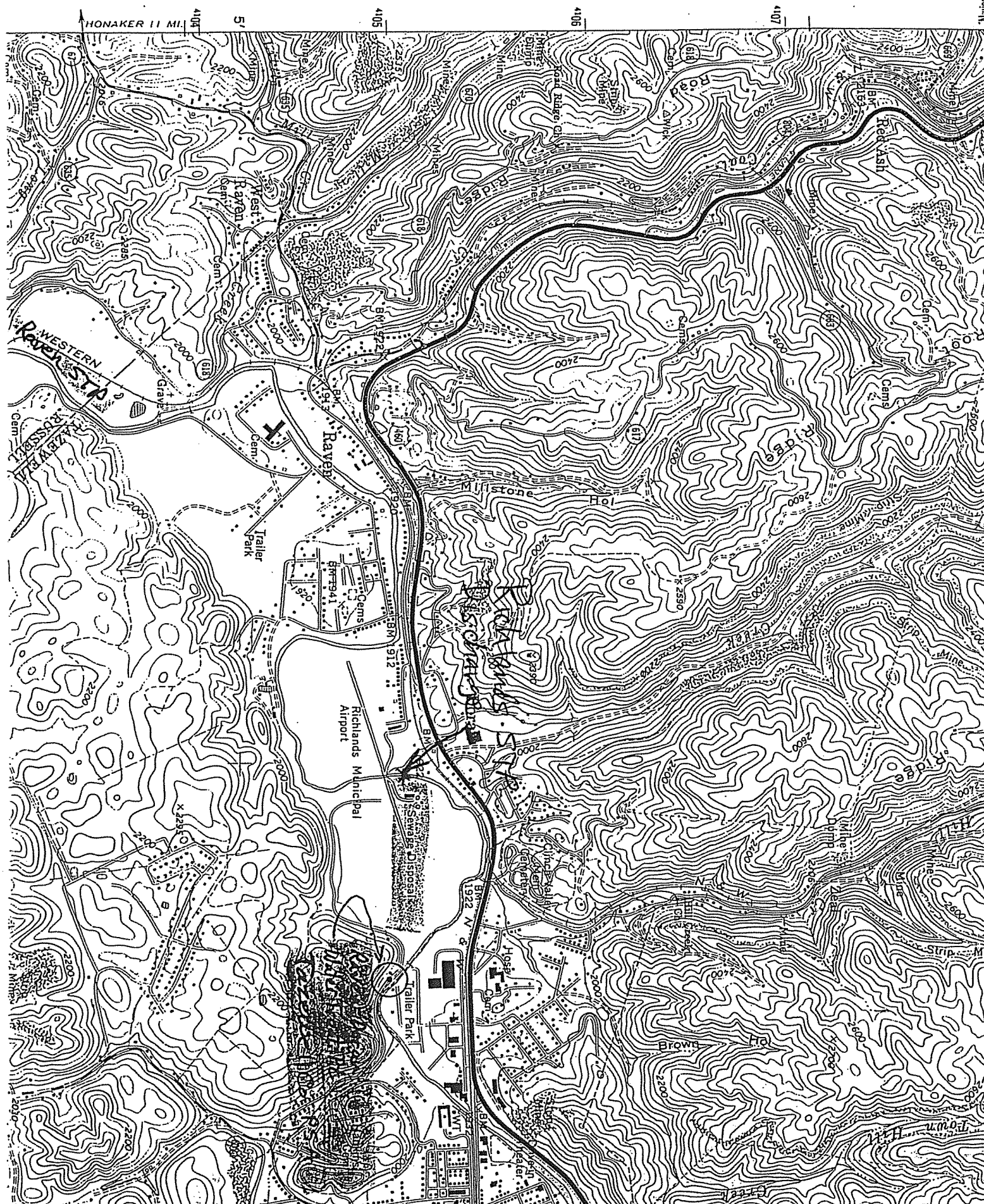
Date



## ATTACHMENT 1

### Treatment Facilities Description & Location

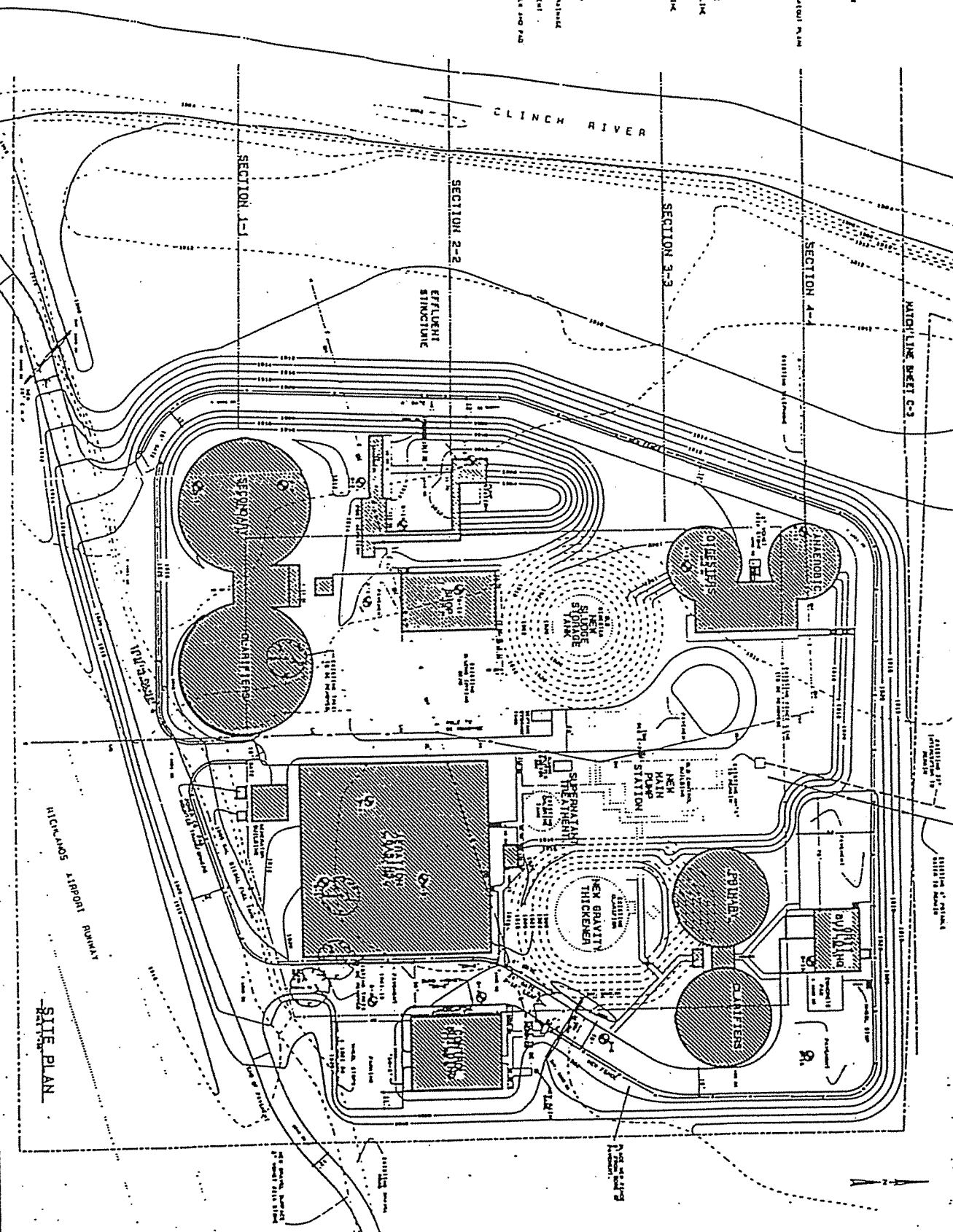
William Dineen



LEGEND

- 1. Existing Contour
- 2. Existing Grade Line
- 3. New Grade Line
- 4. New Contour Line
- 5. Proposed Sewer Line
- 6. Proposed Storm Water Line
- 7. Proposed Water Line
- 8. Proposed Gas Line
- 9. Proposed Electric Line
- 10. Proposed Telephone Line
- 11. Proposed Cable Line
- 12. Proposed Light Rail Line
- 13. Proposed Road Right-of-Way
- 14. Proposed Road Centerline
- 15. Proposed Road Edge
- 16. Proposed Road Shoulder
- 17. Proposed Road Median
- 18. Proposed Road Intersection
- 19. Proposed Road Bridge
- 20. Proposed Road Tunnel
- 21. Proposed Road Overpass
- 22. Proposed Road Underpass
- 23. Proposed Road Culvert
- 24. Proposed Road Drainage
- 25. Proposed Road Erosion Control
- 26. Proposed Road Retention Wall
- 27. Proposed Road Slope Protection
- 28. Proposed Road Storm Water Management
- 29. Proposed Road Flood Protection
- 30. Proposed Road Emergency Egress
- 31. Proposed Road Emergency Access
- 32. Proposed Road Emergency Shelter
- 33. Proposed Road Emergency Evacuation Route
- 34. Proposed Road Emergency Communication
- 35. Proposed Road Emergency Medical Services
- 36. Proposed Road Emergency Fire Services
- 37. Proposed Road Emergency Law Enforcement
- 38. Proposed Road Emergency Public Safety
- 39. Proposed Road Emergency Disaster Relief
- 40. Proposed Road Emergency Humanitarian Assistance
- 41. Proposed Road Emergency Crisis Management
- 42. Proposed Road Emergency Incident Response
- 43. Proposed Road Emergency Situation Awareness
- 44. Proposed Road Emergency Decision Making
- 45. Proposed Road Emergency Coordination
- 46. Proposed Road Emergency Collaboration
- 47. Proposed Road Emergency Cooperation
- 48. Proposed Road Emergency Support
- 49. Proposed Road Emergency Assistance
- 50. Proposed Road Emergency Aid
- 51. Proposed Road Emergency Help
- 52. Proposed Road Emergency Relief
- 53. Proposed Road Emergency Alleviation
- 54. Proposed Road Emergency Mitigation
- 55. Proposed Road Emergency Prevention
- 56. Proposed Road Emergency Protection
- 57. Proposed Road Emergency Preparedness
- 58. Proposed Road Emergency Response
- 59. Proposed Road Emergency Recovery
- 60. Proposed Road Emergency Resilience
- 61. Proposed Road Emergency Sustainability
- 62. Proposed Road Emergency Well-being
- 63. Proposed Road Emergency Quality of Life
- 64. Proposed Road Emergency Happiness
- 65. Proposed Road Emergency Satisfaction
- 66. Proposed Road Emergency Fulfillment
- 67. Proposed Road Emergency Purpose
- 68. Proposed Road Emergency Meaning
- 69. Proposed Road Emergency Significance
- 70. Proposed Road Emergency Value
- 71. Proposed Road Emergency Importance
- 72. Proposed Road Emergency Relevance
- 73. Proposed Road Emergency Impact
- 74. Proposed Road Emergency Influence
- 75. Proposed Road Emergency Effect
- 76. Proposed Road Emergency Consequence
- 77. Proposed Road Emergency Result
- 78. Proposed Road Emergency Outcome
- 79. Proposed Road Emergency End Result
- 80. Proposed Road Emergency Final Outcome
- 81. Proposed Road Emergency Last Result
- 82. Proposed Road Emergency Ultimate Result
- 83. Proposed Road Emergency Final Destination
- 84. Proposed Road Emergency End Point
- 85. Proposed Road Emergency Destination
- 86. Proposed Road Emergency Goal
- 87. Proposed Road Emergency Objective
- 88. Proposed Road Emergency Aim
- 89. Proposed Road Emergency Intention
- 90. Proposed Road Emergency Purpose
- 91. Proposed Road Emergency Mission
- 92. Proposed Road Emergency Vision
- 93. Proposed Road Emergency Dream
- 94. Proposed Road Emergency Hope
- 95. Proposed Road Emergency Faith
- 96. Proposed Road Emergency Trust
- 97. Proposed Road Emergency Belief
- 98. Proposed Road Emergency Confidence
- 99. Proposed Road Emergency Assurance
- 100. Proposed Road Emergency Certainty

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84. Proposed Road Emergency End Point  
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100. Proposed Road Emergency Certainty



WATER POLLUTION CONTROL FACILITY

TOWN OF BOWLING GREEN, VIRGINIA

SITE/GRADING PLAN

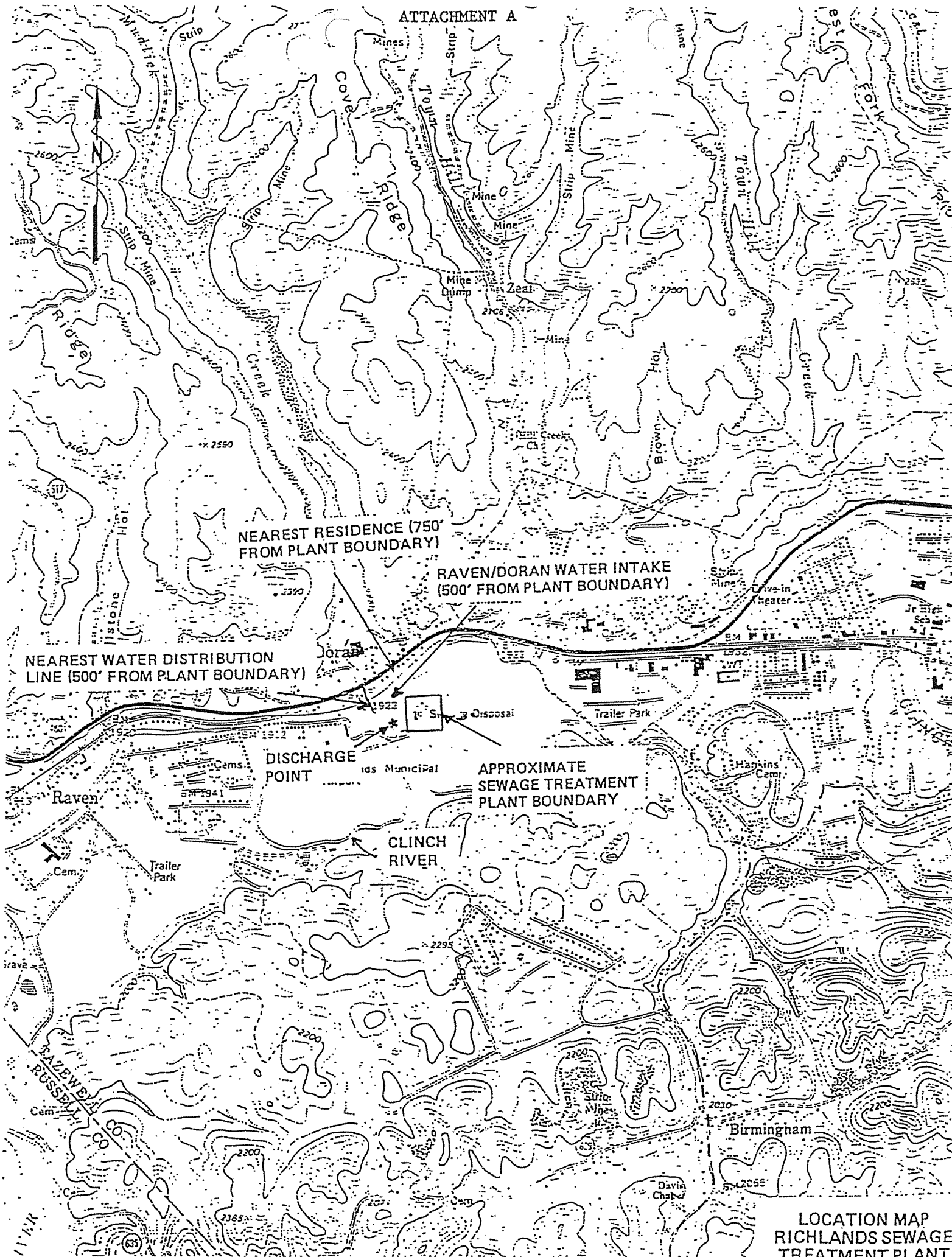
THOMPSON & LITTON, INC.

ENGINEERS

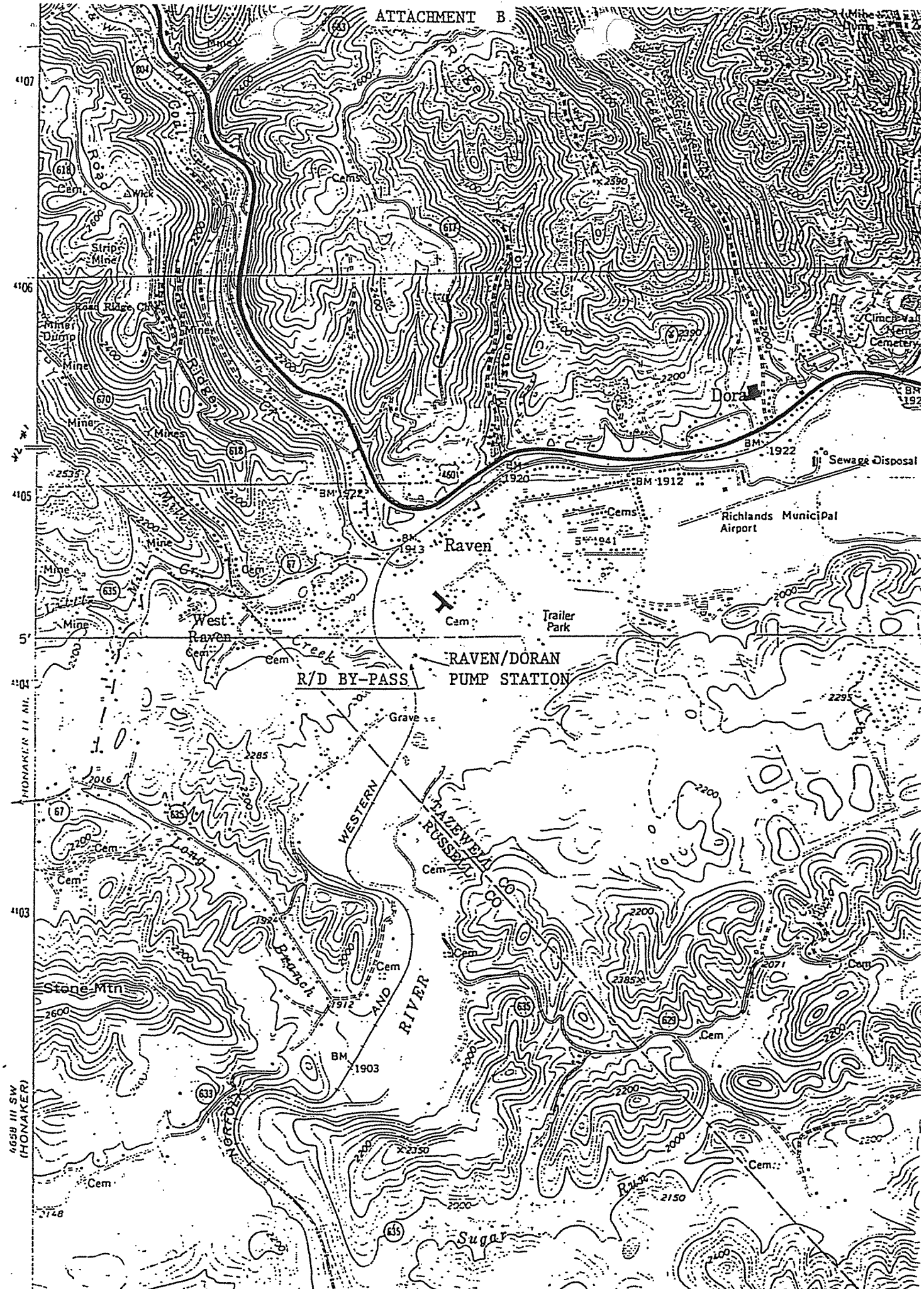
DESIGNERS, PLANNERS & MORE

3643

C-1



LOCATION MAP  
RICHLANDS SEWAGE  
TREATMENT PLANT



659 III SW  
(HONAKER)

ATTACHMENT 2  
Effluent Limits Calculations

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION  
Water Quality Assessments and Planning  
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

SUBJECT: Flow Frequency Determination  
Richlands Regional WWTP - VA#0021199

TO: Fred Wyatt, SWRO

FROM: Paul E. Herman, P.E., WQAP

DATE: February 25, 2002

COPIES: File

This memo supersedes my March 25, 1997, memo to you concerning the subject VPDES permit.

The Richlands Regional WWTP discharges to the Clinch River near Doran, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The USGS operated a continuous record gage on the Clinch River at Richlands, VA (#03521500) from 1946 to 1989. The gage is located approximately 4.0 miles upstream of the discharge point. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge point were determined by drainage area proportions and have been reduced by the volume of the water withdrawn by the Town of Richlands WTP and by the Tazewell PSA Raven-Doran WTP. Both WTP's lie between the gage and the Richlands Regional WWTP discharge point. Adjustments have not been made for other upstream discharges, withdrawals or springs.

Clinch River at Richlands, VA (#03521500):

	Drainage Area = 137 mi <sup>2</sup>
1Q10 = 12 cfs	High Flow 1Q10 = 20 cfs
7Q10 = 16 cfs	High Flow 7Q10 = 27 cfs
30Q5 = 21 cfs	HM = 66 cfs
	Annual Average = 190 cfs

The high flow months are December through May. During the high flow period, the maximum withdrawal by the Richlands WTP equaled 39.1 million gallons (2.09 cfs) and occurred during February 1996 while the maximum withdrawal by the Raven-Doran WTP equaled 10.2 million gallons (0.51 cfs) and occurred during December 1997. During the low flow period, the maximum withdrawal by the Richlands WTP equaled 32.3 million gallons (1.61 cfs) and occurred during July 1996 while the maximum withdrawal by the Raven-Doran WTP equaled 11.28 million gallons (0.58 cfs) and occurred during November 1993.

Clinch River at Richlands WWTP discharge point:

$$\text{Drainage Area} = 163.43 \text{ mi}^2$$

$$1Q10 = 14 \text{ cfs} - 1.61 \text{ cfs} - 0.58 \text{ cfs} = 11.81 \text{ cfs} = 7.63 \text{ MGD}$$

$$7Q10 = 19 \text{ cfs} - 1.61 \text{ cfs} - 0.58 \text{ cfs} = 16.81 \text{ cfs} = 10.87 \text{ MGD}$$

$$\text{High Flow } 1Q10 = 24 \text{ cfs} - 2.09 \text{ cfs} - 0.51 \text{ cfs} = 21.40 \text{ cfs} = 13.83 \text{ MGD}$$

$$\text{High Flow } 7Q10 = 32 \text{ cfs} - 2.09 \text{ cfs} - 0.51 \text{ cfs} = 29.40 \text{ cfs} = 19.00 \text{ MGD}$$

$$30Q5 = 25 \text{ cfs} - 1.61 \text{ cfs} - 0.58 \text{ cfs} = 22.81 \text{ cfs} = 14.74 \text{ MGD}$$

$$\text{HM} = 79 \text{ cfs} - 1.61 \text{ cfs} - 0.58 \text{ cfs} = 76.81 \text{ cfs} = 49.65 \text{ MGD}$$

$$\text{Annual Average} = 190 \text{ cfs} - 1.61 \text{ cfs} - 0.58 \text{ cfs} = 187.81 \text{ cfs} = 121.46 \text{ MGD}$$

If you have any questions concerning this analysis, please let me know.

$$30Q10 = \frac{163.43}{137} (12.3) \text{ MGD} = 14.7 \text{ MGD}$$

$$\text{HF } 30Q10 = \frac{163.43}{137} (25.3) \text{ MGD} = 30.2 \text{ MGD}$$

## Calculation of Total Ammonia Nitrogen Limits

Facility Name: Richlands WWTP  
VPDES Permit No: VA0021199

NH<sub>3</sub>-N limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human Health standards are not applicable for ammonia.

Based on Tables 1B & 2B of the Water Quality Standards, Total Ammonia standards were calculated for a Summer Tier and a Winter Tier. The following 90th. percentile pH and temperature values were used, based on Storet and other stream monitoring data.

Summer pH = 8.09

Dry Season Temperature = 24° C

Winter pH = 8.09

Wet Season Temperature = 16° C

pH values are based on actual stream data.

The calculated ammonia nitrogen water quality standards (WQS) are:

$$\begin{aligned} \text{Acute } \text{AO}_d &= \text{WQS}_{\text{dry}} = (5.60 \times 0.822) \text{ mg/l} = 4.60 \text{ mg/l} \\ \text{Acute } \text{AO}_w &= \text{WQS}_{\text{wet}} = (5.63 \times 0.822) \text{ mg/l} = 4.62 \text{ mg/l} \end{aligned}$$

$$\begin{aligned} \text{Chronic } \text{Co}_d &= \text{WQS}_{\text{dry}} = (0.97 \times 0.822) \text{ mg/l} = 0.80 \text{ mg/l} \\ \text{Chronic } \text{Co}_w &= \text{WQS}_{\text{wet}} = (1.28 \times 0.822) \text{ mg/l} = 1.05 \text{ mg/l} \end{aligned}$$

$$Q_e = \text{Design Flow of STP MGD} = 4.0$$

$$Q_s = \text{Critical Flow (1Q10 for Acute, 7Q10 for Chronic)}$$

$$Q_{s-1} = 1\text{Q10 Flow (MGD)} = 7.66$$

$$Q_{s-1w} = 1\text{Q10 High Flow (MGD)} = 14.20$$

$$Q_{s-7} = 7\text{Q10 Flow (MGD)} = 10.90$$

$$Q_{s-7w} = 7\text{Q10 High Flow (MGD)} = 19.37$$

FORMULAS USED IN THE CALCULATION OF  
ACUTE CRITERIA VALUES FOR AMMONIA IN FRESHWATER

[The one hour average concentration of ammonia  
(in mg/L as un-ionized NH<sub>3</sub>) calc. as follows].

B.- ACUTE AMMONIA STANDARD FOR WARMWATER HABITATS -  
TROUT/ OTHER SENSITIVE COLDWATER SPECIES ABSENT

ENTER STREAM TEMPERATURE 24.00 °C

ENTER STREAM pH 8.09 S.U.

FORMULA: ACUTE (un-ionized) AMMONIA CRITERIA =  $0.52 / FT / FpH / 2$

ACUTE un-ionized AMMONIA CRITERIA = 0.34

where: 1) FT = Final Temperature =  $10^{0.03(20 - TCAP)}$  ; TCAP < T < 30 °C  
TCAP = 25 °C since trout, coldwater species absent

or =  $10^{0.03(20 - T)}$  ; 0 < T < TCAP

FT = 0.76

2) FpH = Final pH = 1 ; if 8.0 < pH < 9.0

or =  $(1 + 10^{7.4 - pH}) / 1.25$  ; if 6.5 < pH < 8.0

FpH = 1.00

3) Fraction of un-ionized Ammonia =  $1 / (10^{pKa - pH} + 1)$

pKa =  $0.09018 + (2729.92 / (273.2 + \text{Temperature } ^\circ\text{C}))$

pKa = 9.28

Fraction of un-ionized Ammonia = 0.06

4) Total Ammonia Criteria = Calc. Un-ionized Criteria / Fraction of Un-ionized NH<sub>3</sub>

Total Ammonia Criteria = 5.60

5) NH<sub>3</sub>-N Criteria Value =  $5.60 \times .822 = 4.60 \text{ mg/L}$

FORMULAS USED IN THE CALCULATION OF  
ACUTE CRITERIA VALUES FOR AMMONIA IN FRESHWATER

[The one hour average concentration of ammonia  
(in mg/L as un-ionized NH<sub>3</sub>) calc. as follows].

P.- ACUTE AMMONIA STANDARD FOR WARMWATER HABITATS -  
TROUT/ OTHER SENSITIVE COLDWATER SPECIES ABSENT

ENTER STREAM TEMPERATURE 16.00 °C

ENTER STREAM pH 8.09 S.U.

FORMULA: ACUTE (un-ionized) AMMONIA CRITERIA =  $0.52 / FT / FpH / 2$

ACUTE un-ionized AMMONIA CRITERIA = 0.20

where: 1) FT = Final Temperature =  $\frac{0.03(20 - TCAP)}{10}$  ; TCAP < T < 30 °C  
TCAP = 25 °C since trout, coldwater species absent

or =  $\frac{0.03(20 - T)}{10}$  ; 0 < T < TCAP

FT = 1.32

2) FpH = Final pH = 1 ; if 8.0 < pH < 9.0

or =  $(1 + 10^{7.4 - pH}) / 1.25$  ; if 6.5 < pH < 8.0

FpH = 1.00

3) Fraction of un-ionized Ammonia =  $1 / (10^{pKa - pH} + 1)$

pKa =  $0.09018 + (2729.92 / (273.2 + \text{Temperature } ^\circ\text{C}))$

pKa = 9.53

Fraction of un-ionized Ammonia = 0.04

4) Total Ammonia Criteria = Calc. Un-ionized Criteria / Fraction of Un-ionized NH<sub>3</sub>

Total Ammonia Criteria = 5.63

5) NH<sub>3</sub>-N Criteria Value = 5.63 X .822 = 4.62 mg/L

FORMULAS USED IN THE CALCULATION OF  
CHRONIC CRITERIA VALUES FOR AMMONIA IN FRESHWATER

[The 4-DAY average concentration of ammonia  
(in mg/L as un-ionized NH<sub>3</sub>) calc. as follows].

D.- CHRONIC AMMONIA STANDARD FOR WARMWATER HABITATS -  
TROUT/ OTHER SENSITIVE COLDWATER SPECIES ABSENT

ENTER STREAM TEMPERATURE 24.00 °C

ENTER STREAM pH 8.09 S.U.

FORMULA: CHRONIC (un-ionized) NH<sub>3</sub> CRITERIA= 0.80/ FT/ FpH/ RATIO

CHRONIC un-ionized AMMONIA CRITERIA= 0.06

where: 1) FT = Final Temperature =  $\frac{0.03(20 - \text{TCAP})}{10}$  ; TCAP < T < 30 °C  
TCAP = 20 °C since trout, coldwater species absent

or =  $\frac{0.03(20 - T)}{10}$  ; 0 < T < TCAP

FT = 1.00

2) FpH = Final pH = 1 ; if 8.0 < pH < 9.0

or =  $\frac{(1 + 10^{7.4 - \text{pH}})}{1.25}$  ; if 6.5 < pH < 8.0

FpH = 1.00

3) RATIO = 13.5 ; if 7.7 < pH < 9.0

or RATIO =  $20.25 \times (10^{\frac{7.7 - \text{pH}}{1}}) / (1 + 10^{\frac{7.4 - \text{pH}}{1}})$  ; if 6.5 < pH < 7.7

RATIO = 13.50

4) Fraction of un-ionized Ammonia =  $\frac{1}{(10^{\text{pKa} - \text{pH}} + 1)}$

pKa =  $0.09018 + (2729.92 / (273.2 + \text{Temperature } ^\circ\text{C}))$

pKa = 9.28

Fraction of un-ionized Ammonia = 0.06

5) Total Ammonia Criteria = Calc. Un-ionized Criteria/ Fraction of Un-ionized NH<sub>3</sub>

Total Ammonia Criteria = 0.97

6) NH<sub>3</sub>-N Criteria Value = 0.97 X .822 = 0.80 mg/L

FORMULAS USED IN THE CALCULATION OF  
CHRONIC CRITERIA VALUES FOR AMMONIA IN FRESHWATER

[The 4-DAY average concentration of ammonia  
(in mg/L as un-ionized NH<sub>3</sub>) calc. as follows].

D.- CHRONIC AMMONIA STANDARD FOR WARMWATER HABITATS -  
TROUT/ OTHER SENSITIVE COLDWATER SPECIES ABSENT

ENTER STREAM TEMPERATURE 16.00 °C

ENTER STREAM pH 8.09 S.U.

FORMULA: CHRONIC (un-ionized) NH<sub>3</sub> CRITERIA= 0.80/ FT/ FpH/ RATIO

CHRONIC un-ionized AMMONIA CRITERIA= 0.04

where: 1) FT = Final Temperature =  $\frac{0.03(20 - \text{TCAP})}{10}$  ; TCAP < T < 30 °C  
TCAP = 20 °C since trout, coldwater species absent

or =  $\frac{0.03(20 - T)}{10}$  ; 0 < T < TCAP

FT = 1.32

2) FpH = Final pH = 1 ; if 8.0 < pH < 9.0

or =  $(1 + 10^{7.4 - \text{pH}})/1.25$  ; if 6.5 < pH < 8.0

FpH = 1.00

3) RATIO = 13.5 ; if 7.7 < pH < 9.0

or RATIO =  $20.25 \times (10^{7.7 - \text{pH}})/(1 + 10^{7.4 - \text{pH}})$  ; if 6.5 < pH < 7.7

RATIO = 13.50

4) Fraction of un-ionized Ammonia =  $1/(10^{\text{pka} - \text{pH}} + 1)$

pka =  $0.09018 + (2729.92/(273.2 + \text{Temperature } ^\circ\text{C}))$

pka = 9.53

Fraction of un-ionized Ammonia = 0.04

5) Total Ammonia Criteria = Calc. Un-ionized Criteria/ Fraction of Un-ionized NH<sub>3</sub>

Total Ammonia Criteria = 1.28

6) NH<sub>3</sub>-N Criteria Value = 1.28 X .822 = 1.05 mg/L

MIXING ANALYSIS FOR Richlands WWTP

Effluent flow = 4 MGD  
Stream 7Q10 flow = 10.9 MGD  
Width = 50 ft  
Bottom scale = 3  
Channel has normal irregularities

Stream 1Q10 flow = 7.659999 MGD  
Slope (ft/ft) = .00085

CHRONIC RESULTS

7Q10 depth = 1.12 ft  
7Q10 velocity = 0.41 ft/sec = 6.7 mi / day  
Mixing length @ 7Q10 = 2114 ft  
Residence time = 0.059 days

\*\*COMPLETE MIX MAY BE USED FOR THE CHRONIC WLA\*\*  
Percent of 7Q10 to be used for WLA<sub>c</sub> = 100%

ACUTE RESULTS

1Q10 depth = 0.96 ft  
1Q10 velocity = 0.38 ft/sec = 6.1 mi / day  
Mixing length @ 1Q10 = 2404 ft  
Residence time = 1.780 hours

\*\*COMPLETE MIX CANNOT BE USED FOR THE ACUTE WLA\*\*  
Percent of 1Q10 to be used for WLA<sub>a</sub> = 56%

Use print screen for hard copy

C:\MIXPROG>

# Calculation of Total Ammonia Nitrogen Limits (continued)

The water quality wasteload allocations (WQ-WLAs) are calculated as follows, assuming a background concentration of 0:

## ACUTE

$$WQ-WLA_{ad} = \text{acute dry WQ-WLA} = \frac{[Ao_d(QS-1_{dry} + Qe) - QS-1_{dry}(\text{background})]}{Qe}$$

$$WQ-WLA_{ad} = [4.60(7.66 \times 5.56 + 4.0) - 0] / 4.0 = 9.5 \text{ mg/l}$$

$$WQ-WLA_{aw} = \text{acute wet WQ-WLA} = \frac{[Ao_w(QS-1_{wet} + Qe) - QS-1_{wet}(\text{background})]}{Qe}$$

$$WQ-WLA_{aw} = [4.62(14.20 \times 5.56 + 4.0) - 0] / 4.0 = 13.8 \text{ mg/l}$$

## CHRONIC

$$WQ-WLA_{cd} = \text{chronic dry AWAL} = \frac{[Co_d(QS-7_{dry} + Qe) - QS-7_{dry}(\text{background})]}{Qe}$$

$$WQ-WLA_{cd} = [0.8(10.90 + 4.0) - 0] / 4.0 = 3.0 \text{ mg/l}$$

$$WQ-WLA_{cw} = \text{chronic wet AWAL} = \frac{[Co_w(QS-7_{wet} + Qe) - QS-7_{wet}(\text{background})]}{Qe}$$

$$WQ-WLA_{cw} = [1.05(19.37 + 4.0) - 0] / 4.0 = 6.1 \text{ mg/l}$$

Analysis of the Richlands WWTP effluent data for Ammonia Nitrogen

The statistics for Ammonia Nitrogen are:

Number of values	=	1
Quantification level	=	.2
Number < quantification	=	0
Expected value	=	9
Variance	=	29.16001
C.V.	=	.6
97th percentile	=	21.90076
Statistics used	=	Reasonable potential assumptions - Type 2 data

The WLAs for Ammonia Nitrogen are:

Acute WLA	=	9.5
Chronic WLA	=	3
Human Health WLA	=	----

The limits are based on chronic toxicity and 2 samples/month.

Maximum daily limit	=	4.387724	} Low Flow
Average monthly limit	=	3.568028	

It is recommended that only the maximum daily limit be used:

DATA

9

Analysis of the Richlands WWTP effluent data for Ammonia Nitrogen

The statistics for Ammonia Nitrogen are:

Number of values	=	1
Quantification level	=	.2
Number < quantification	=	0
Expected value	=	9
Variance	=	29.16001
C.V.	=	.6
97th percentile	=	21.90076
Statistics used	=	Reasonable potential assumptions - Type 2 data

The WLAs for Ammonia Nitrogen are:

Acute WLA	=	13.8
Chronic WLA	=	6.1
Human Health WLA	=	----

The limits are based on chronic toxicity and 2 samples/month.

Maximum daily limit	=	8.921706	} High Flow
Average monthly limit	=	7.254989	

It is recommended that only the maximum daily limit be used.

DATA

9

6BCLN339.53

STORET System

37 06 42.0 081 37 18.0 4

STATE ROUTE 637 BR, APPROX 0.25 MI. N OF MAXWELL

51185 VIRGINIA TAZEWEEL

04-TENNESSEE 040600

5-TENNESSEE + BIG SANDY

21VASWCB 06010205

/TYP/AMBNT/STREAM

920201 DEPTH 0

INDEX  
MILES

00400

DATE FROM TO	TIME OF DAY	DEPTH FEET	PH -SU
--------------------	-------------------	---------------	-----------

92/05/26	1000	0	7.80	Wet
92/05/27	0850	0	7.54	
92/07/06	1425	0	7.87	Dry
92/07/06	1425	1	7.87	
92/09/02	1000	0	<del>not typical 8.21</del>	Wet
92/11/05	1253	0	7.77	
93/01/07	1316	0	8.10	Wet
93/03/23	1029	0	7.62	
93/03/25	1205	0	7.94	Dry
93/07/01	0845	0	7.64	
93/09/08	1030	0	<del>not typical 8.27</del>	Wet
93/11/29	1321	0	7.53	
94/02/15	1346	0	7.51	Wet
94/05/26	0927	0	7.56	
94/07/28	1150	0	7.56	Dry
94/09/22	1030	0	7.66	
94/11/14	1433	0	-8.15	Wet
95/02/23	1328	0	8.11	
95/03/29	1104	0	7.98	Wet
95/05/24	0921	0	7.57	
95/07/25	0910	0	7.54	Dry
95/09/13	1008	0	-8.09	
95/11/14	1122	0	7.91	Wet
96/02/26	0940	0	7.60	
96/03/28	0910	0	7.72	Wet
96/05/21	1023	0	8.09	
96/07/29	0827	0	7.76	Dry
96/09/09	0915	0	7.60	
96/11/12	0935	0	<del>not typical 8.32</del>	Wet
97/01/22	0900	0	8.03	

90th percentile pH (low flow) = 8.09  
 90th percentile pH (high flow) = 8.09

ENTER PARM CODE, "NEXT STATION", OR "ALL"

next  
ENTER AGENCY CODE, "SAME", OR "END"

go  
6BCLN339.53

STORET System

37 06 42.0 081 37 18.0 4  
STATE ROUTE 637 BR, APPROX 0.25 MI. N OF MAXWELL  
51185 VIRGINIA TAZEWELL  
04-TENNESSEE 040600  
6-TENNESSEE + BIG SANDY  
21VASWCB 06010205 /TYPA/AMBNT/STREAM  
920201 DEPTH 0

INDEX  
MILES

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT
92/05/26	1000	0	15.1
92/05/27	0850	0	13.3
92/07/06	1425	0	17.2
92/07/06	1425	1	17.2
92/09/02	1000	0	20.0
92/11/05	1253	0	12.1
93/01/07	1316	0	8.7
93/03/23	1029	0	10.1
93/03/25	1205	0	11.0
93/07/01	0845	0	21.3
93/09/08	1030	0	21.3
93/11/29	1321	0	4.2
94/02/15	1346	0	6.5
94/05/26	0927	0	18.5
94/07/28	1150	0	18.6
94/09/22	1030	0	16.9
94/11/14	1433	0	10.6
95/02/23	1328	0	8.6
95/03/29	1104	0	10.9
95/05/24	0921	0	17.5
95/07/25	0910	0	22.9
95/09/13	1008	0	20.5
95/11/14	1122	0	6.4
96/02/26	0940	0	9.9
96/03/28	0910	0	8.2
96/05/21	1023	0	18.8
96/07/29	0827	0	20.5
96/09/09	0915	0	20.0
96/11/12	0935	0	4.5
97/01/22	0900	0	5.4

ENTER FARM CODE, "NEXT STATION", OR "ALL"

TOWN OF RICHLANDS

CLINCH RIVER SURVEY

Effluent Limitations for the  
Proposed 4.0 MGD Sewage Treatment Plant

VIRGINIA STATE WATER CONTROL BOARD  
SOUTHWEST REGIONAL OFFICE

By Fred M. Wyatt

Allen J. Newman

and

M. Dale Phillips

## I. INTRODUCTION & RESULTS

The Town of Richlands presently owns and operates a 0.8 MGD primary wastewater treatment facility which discharges into the Clinch River near Doran, Virginia, under NPDES Permit No. VA0021199. The facility is unable to meet the final effluent limitations contained in the NPDES Permit. These final effluent limitations require secondary treatment (30/30 mg/l for monthly average BOD<sub>5</sub> and Suspended Solids concentrations at the present flow of 0.8 MGD). However, the permit states that these limitations are subject to verification by an in-stream monitoring program conducted by the Board and may be revised, depending on the outcome of the modeling.

In order to obtain compliance with the final effluent limitations by July 1, 1988, as required by the Clean Water Act, the Town of Richlands has signed an amended consent order issued by the State Water Control Board, dated June 4, 1985, which contains interim effluent limitations and a schedule of compliance for achieving compliance with the final effluent limitations.

The Town's consulting engineer is proposing the construction of a 4.0 MGD regional treatment facility to serve the Town of Richlands, Town of Cedar Bluff, Raven-Doran area, and rural Tazewell County. The engineer proposes to treat both non-excessive infiltration as well as non-excessive inflow.

In order to determine effluent limitations for the proposed 4.0 MGD facility, the Board's staff conducted intensive in-stream monitoring surveys on October 3, 1985 and October 17, 1985. Using the results of these surveys, the staff developed a stream model and calculated the required effluent limitations. The effluent limitations are tiered, based on receiving stream temperature.

For the months October through April, the following effluent limitations shall apply:

(1)

DISCHARGE LIMITATIONS

<u>Parameter</u>	<u>Mo. Average</u>		<u>Wk. Average</u>		<u>Instantaneous Limitations</u>	
					<u>Min.</u>	<u>Max.</u>
BOD <sub>5</sub>	30 mg/l	454 kg/d	45 mg/l	681 kg/d	- -	- -
Suspended Solids	30 mg/l	454 kg/d	45 mg/l	681 kg/d	- -	- -
Dissolved Oxygen (mg/l)	- -	- -	- -	- -	6.2	- -

For the months May through September, the following effluent limitations shall apply:

(2)

DISCHARGE LIMITATIONS

<u>Parameter</u>	<u>Mo. Average</u>		<u>Wk. Average</u>		<u>Instantaneous Limitations</u>	
					<u>Min.</u>	<u>Max.</u>
BOD <sub>5</sub>	18 mg/l	273 kg/d	27 mg/l	409 kg/d	- -	- -
Suspended Solids	30 mg/l	454 kg/d	45 mg/l	681 kg/d	- -	- -
Total Kjeldahl Nitrogen (TKN)	9 mg/l	136 kg/d	13.5 mg/l	204 kg/d	- -	- -
Dissolved Oxygen (mg/l)	- -	- -	- -	- -	6.2	- -

Due to a degree of uncertainty in the model, as reflected by the sensitivity analysis (see Part VII-Sensitivity Analysis), the modelers feel that the Town of Richlands should institute an in-stream dissolved oxygen monitoring program which will be required in the NPDES Permit.

## II. SURVEY DISCUSSION

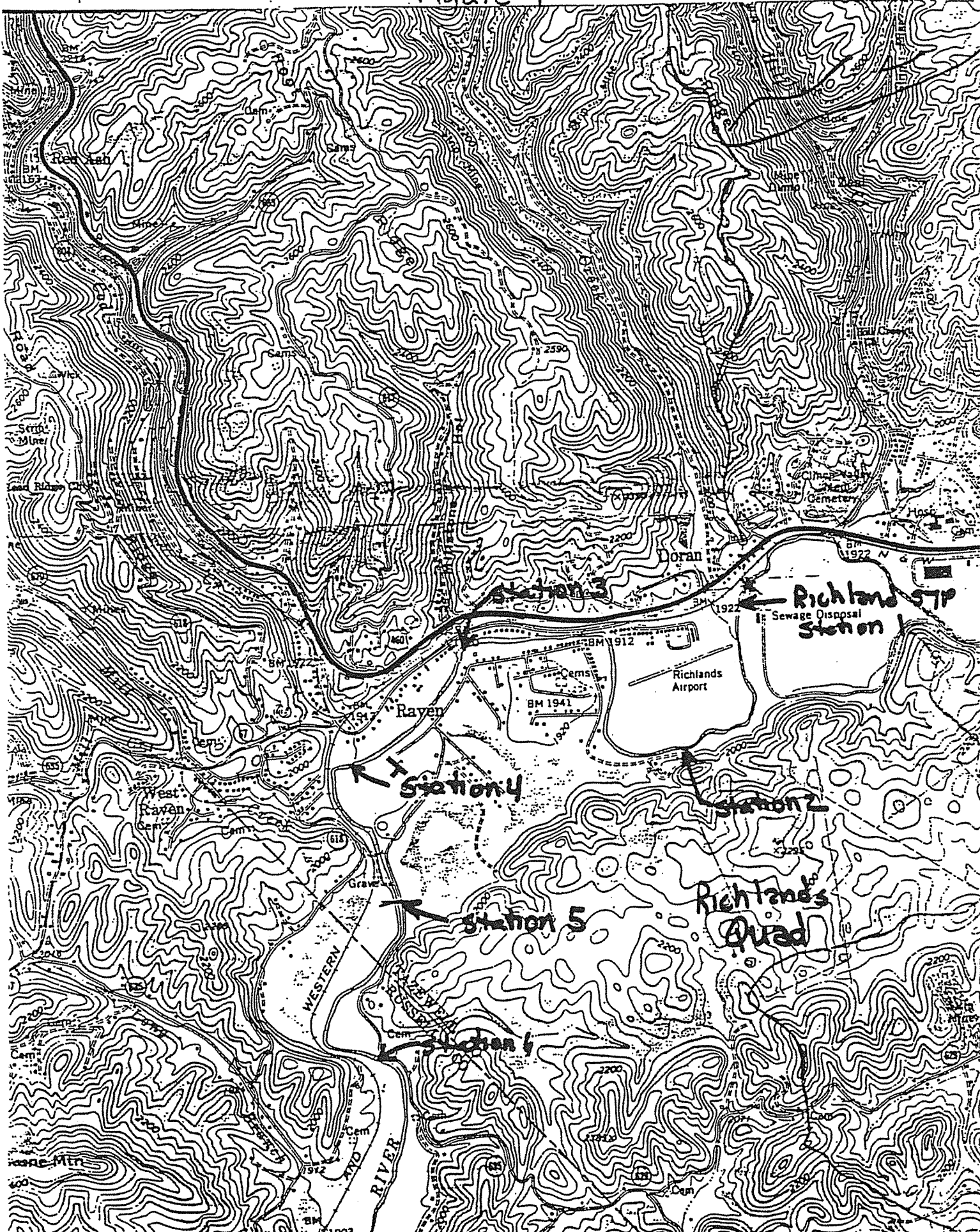
Intensive stream surveys were conducted on October 3 and 17, 1985. Both surveys include seven (7) monitoring stations as shown on the map in Figure 1 and described in Table One.

TABLE ONE

CLINCH RIVER SURVEY STATION LOCATION	
Station	Location
STP	RICHLANDS STP OUTFALL
Control	CLINCH RIVER 50 YDS UPSTREAM OF RICHLANDS STP
2	CLINCH RIVER 0.5 MI DOWNSTREAM OF RICHLANDS STP
3	CLINCH RIVER 1.0 MI DOWNSTREAM OF RICHLANDS STP
4	CLINCH RIVER 1.5 MI DOWNSTREAM OF RICHLANDS STP
5	CLINCH RIVER 2.0 MI DOWNSTREAM OF RICHLANDS STP
6	CLINCH RIVER 2.5 MI DOWNSTREAM OF RICHLANDS STP

The surveys were conducted using rhodamine dye which was dumped into the STP discharge pipe (mixing with the STP effluent) at the beginning of the survey. The STP effluent (at the beginning of the survey) was then tracked and monitored at each of the remaining six stations.

Figure 1



# TABLE TWO SURVEY DATA

## CLINCH RIVER SURVEY 10/3/85

Station	DO mg/l	TEMP °C	BOD <sub>u</sub> mg/l	NOD <sub>u</sub> mg/l	TKN mg/l	NH <sub>3</sub> mg/l	Time of Travel (Hours)
STP	5.00	18	224.70	125.57	29.00	12.00	-
Control	7.80	14	1.85	0.87	0.20	0.10	-
1	7.77	14	7.70	4.20	0.97	0.42	0.00
2	7.00	14	5.43	3.03	0.70	0.50	1.75
3	6.75	14	3.75	3.03	0.70	0.50	2.88
4	6.45	15	4.00	2.60	0.60	0.40	4.80
5	6.50	15	4.13	2.60	0.60	0.40	6.60
6	6.50	16	3.08	2.17	0.50	0.20	7.92

## CLINCH RIVER SURVEY 10/17/85

Station	DO mg/l	TEMP °C	BOD <sub>u</sub> mg/l	NOD <sub>u</sub> mg/l	TKN mg/l	NH <sub>3</sub> mg/l	Time of Travel (Hours)
STP	4.30	17	204.00	121.24	28.00	13.00	-
Control	6.90	13	3.00	0.87	0.20	0.10	-
1	6.84	13	8.00	3.86	0.89	0.42	0.00
2	6.60	13	6.15	2.60	0.60	0.20	1.13
3	5.80	13	5.70	2.60	0.60	0.20	2.42
4	5.30	15	4.70	2.60	0.60	0.20	4.13
5	5.90	17	4.50	2.17	0.50	0.20	5.64
6	6.30	19	4.50	2.17	0.50	0.20	7.06

### III. SURVEY DATA EVALUATION

The survey data is presented in Table Two and the individual laboratory results are presented in Attachment B. The data for Station #1, in Table Two, are complete mix values for the STP effluent and the receiving stream. The complete mix values for Station #1 were calculated, using the following mass balance equation:

$$C_{\text{mix}} = \frac{(C \text{ stream}) \times (\text{stream flowrate}) + (C \text{ STP effluent}) \times (\text{STP flowrate})}{\text{stream flowrate} + \text{STP flowrate}}$$

C = concentration of pollutant mg/l for BOD<sub>u</sub>, NOD<sub>u</sub>, DO, temp., TKN, and NH<sub>3</sub>

Stream flowrate = 25.4 MGD on 10/3/85, and 26.5 MGD on 10/17/85

STP flowrate = 0.685 MGD on 10/3/85, and 0.675 MGD on 10/17/85

The initial mass balance calculations at station 1 yielded values that were significantly lower than the actual in-stream values at Station 2. This problem with the data could not be explained and delayed the completion of the model. The source of the problem was determined in May 1986, to be an inaccurate flow meter at the Richlands Sewage Treatment Plant. The flow meter was registering only about one half of the actual volume being discharged. Using the corrected STP flow rates, the mass balance for both surveys at Station #1 were recalculated and these are the values that are presented in Table Two.

For both surveys, the Total Kjeldahl Nitrogen (TKN) and the ammonia decreased by approximately 0.5 mg/l from Stations 1 to 6, indicating that some nitrogenous oxygen demand was occurring even at the lower stream temperatures of 14 to 16°C. However, the nitrogenous oxygen demand calculated by subtracting the suppressed from the unsuppressed BOD values did not show a consistent pattern. At the higher wasteload allocation temperature, nitrogenous oxygen demand will become a significant factor. Therefore, the  $NOD_u$  utilized in model calibration and verification was calculated theoretically by multiplying the TKN value for each station by 4.33.

The carbonaceous oxygen demand ( $BOD_u$ ) was calculated by averaging the five replicates of the suppressed BOD analysis for each station. In determining  $BOD_u$ , any values significantly out of the range (+25%) were not included in the averages.

#### IV. CALIBRATION

The model calibration was conducted using the data from the 10/3/85 survey. The data was inserted into a computer model developed by the State Water Control Board's Office of Research and Standards. The computer model utilized the expanded Streeter-Phelps formula (defined in Attachment A). The computer model predicted in-stream dissolved oxygen,  $BOD_u$  and  $NOD_u$  values. The model was calibrated, utilizing a "trial and error" selection for the reaeration constant,  $K_2$ . Then the model predictions of dissolved oxygen,  $BOD_u$  and  $NOD_u$  were graphed versus the actual data for the 10/3/85 survey. Further refinements were then made in  $K_1$ ,  $K_n$  and  $K_2$  to obtain the lines for best fit for the model predictions versus the data collected. The graphical presentation of the data and model calibration predictions are shown in Figures 2, 3 and 4.

The model calibration input data is presented below:

##### CONTROL STREAM CONDITIONS:

Flow = 25.1 MGD   D.O. = 7.8 mg/l    $BOD_u$  = 1.85 mg/l

$NOD_u$  = 0.866 mg/l

VARIABLES FOR MODEL CALIBRATION:

The k rates shown are at 20 degrees C. The model temperature corrected them using the formulas for temperature correction in Attachment A:

$K_2 = 8.0d^{-1}$   $K_r = 3.8d^{-1}$   $K_n = 3.2d^{-1}$  Saturation D.O. = 9.4 mg/l Length. = 2.5 mi. Velocity = 7.58 mi./day Temp. = 15°C Elev. = 1900 ft.

CONDITIONS OF THE SEWAGE TREATMENT PLANT EFFLUENT:

Flow = 0.685 MGD D.O. = 5.0 mg/l  $BOD_u = 224.7$  mg/l  $NOD_u = 125.6$  mg/l

The calibration in-stream output predictions are presented below:

Distance (mi.)	D.O.	$BOD_u$	$NOD_u$
from STP discharge:	mg/l	mg/l	mg/l
0.0	7.73	7.77	4.18
0.5	6.79	6.37	3.62
1.0	6.46	5.22	3.13
1.5	6.47	4.27	2.71
2.0	6.66	3.50	2.34
2.5	6.93	2.87	2.02

FIGURE 2

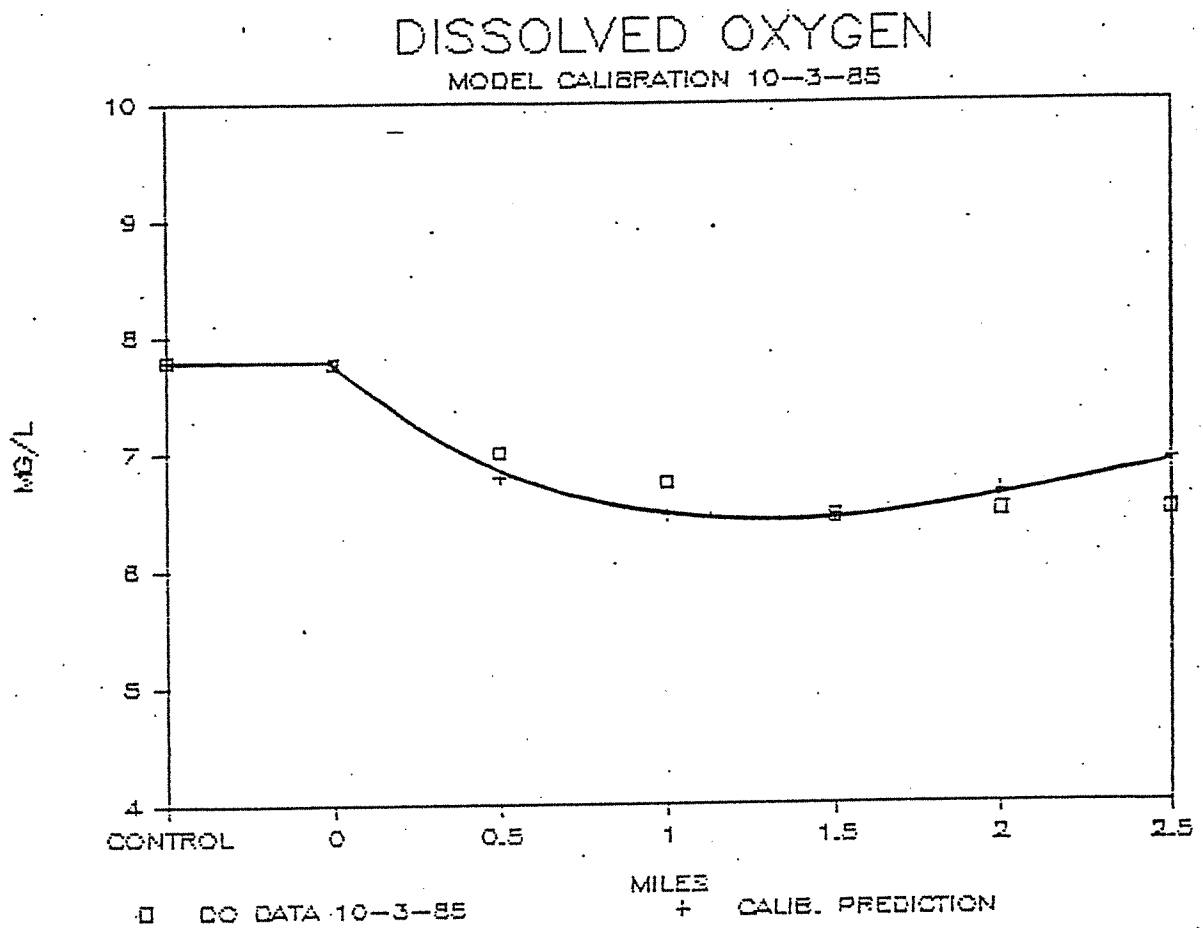


FIGURE 3

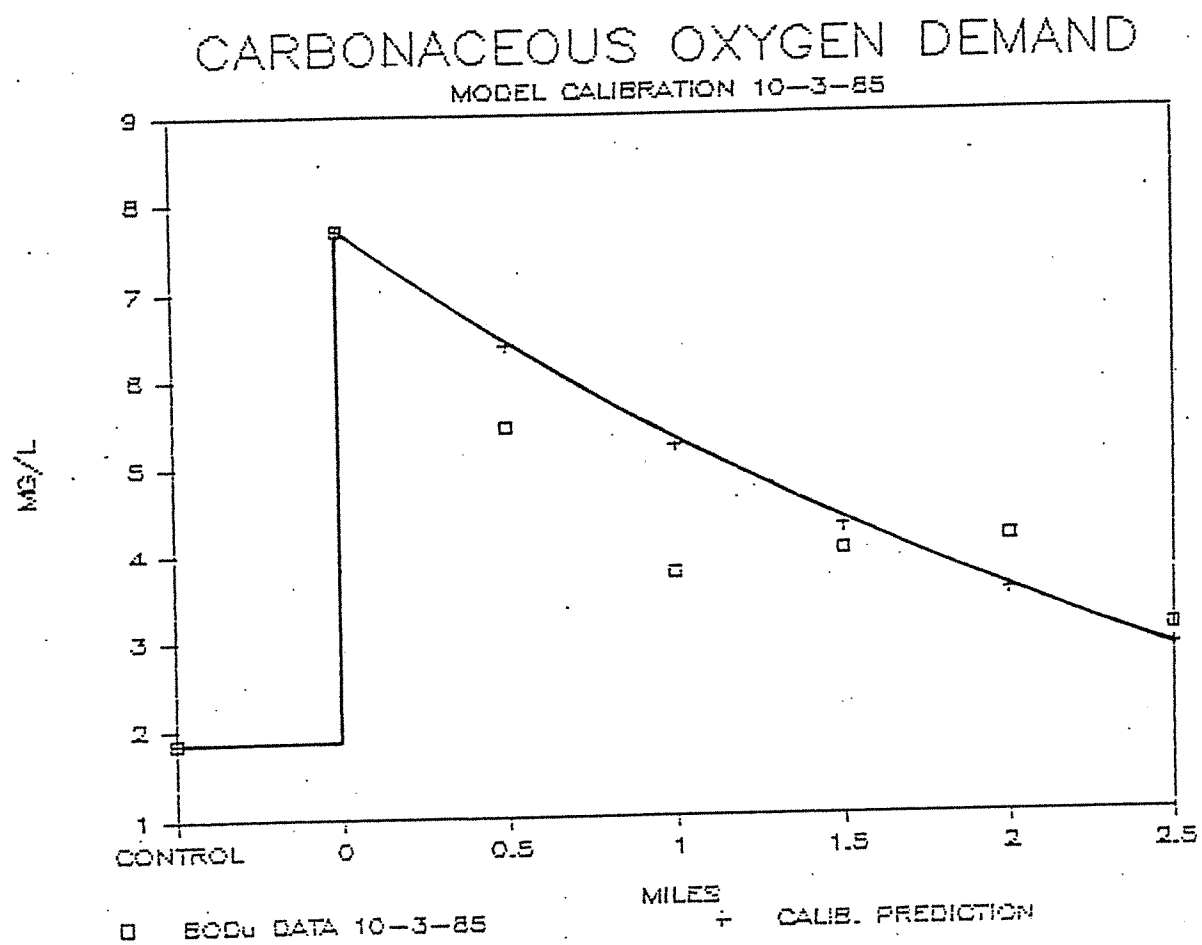
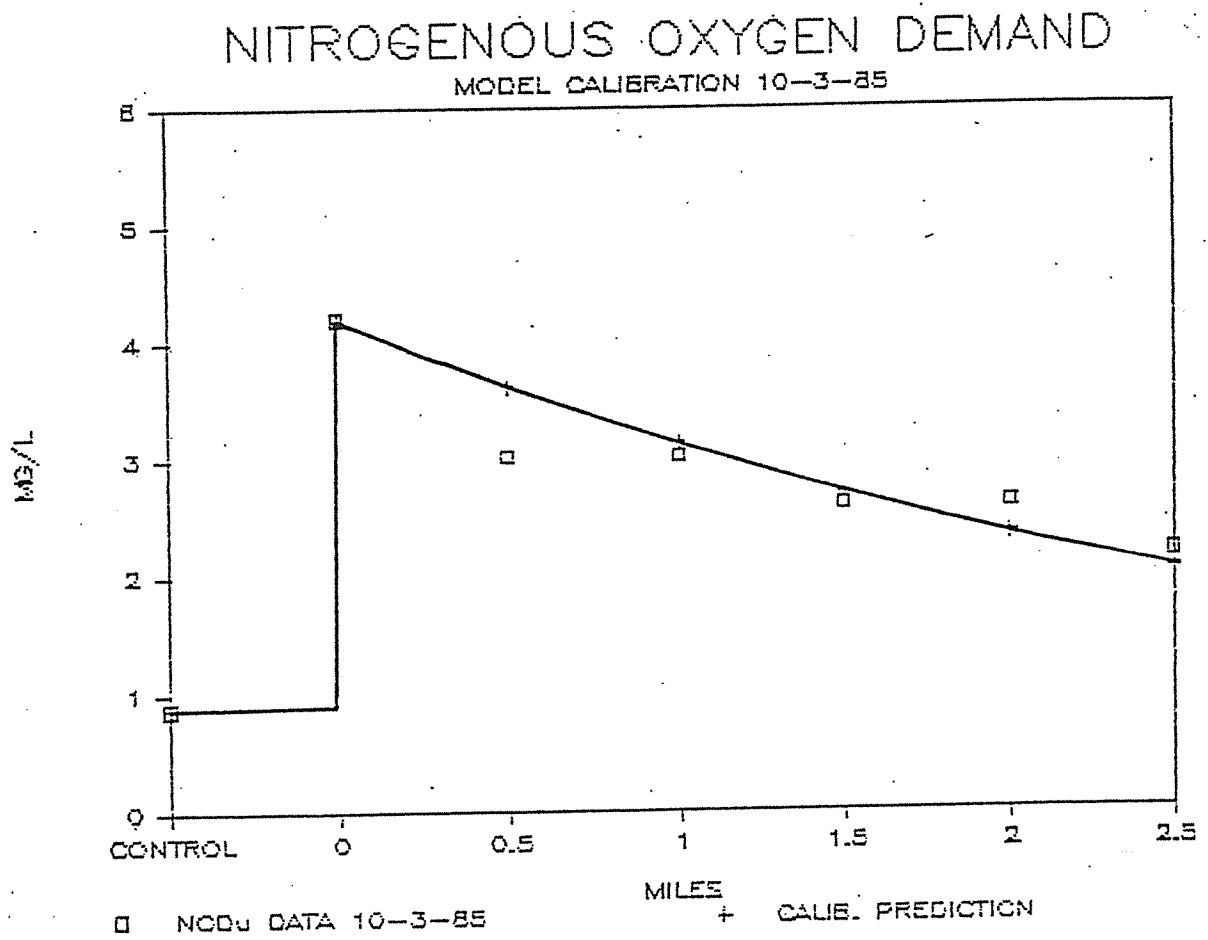


FIGURE 4



## V. VERIFICATION

The model verification was next conducted with the computer model, using the K rates obtained from the previous model calibration and using the data from the 10/17/85 survey. The graphical presentation of the data and the model verification predictions are shown in Figures 5, 6 and 7. This presentation shows that the model was adequately verified. The verification input data is presented below:

### CONTROL STREAM CONDITIONS:

Flow = 26.5 MGD   D.O. = 6.9 mg/l    $BOD_u = 3.0$  mg/l    $NOD_u = 0.866$  mg/l

### VARIABLES FOR MODEL VERIFICATION:

The k rates shown are at 20 degrees C. The model temperature corrected them using formulas for temperature correction in Attachment A.

$K_2 = 8.0d^{-1}$     $K_r = 3.8d^{-1}$     $K_n = 3.23d^{-1}$    Saturation D.O. = 9.40 mg/l   Length = 2.5 mi.   Velocity = 8.53 mi./day   Temp. = 15°C   Elev. = 1900 ft.

### CONDITIONS OF THE SEWAGE TREATMENT PLANT EFFLUENT:

Flow = 0.675 MGD   D.O. = 4.3 mg/l    $BOD_u = 204.0$  mg/l    $NOD_u = 121.2$  mg/l

FIGURE 5

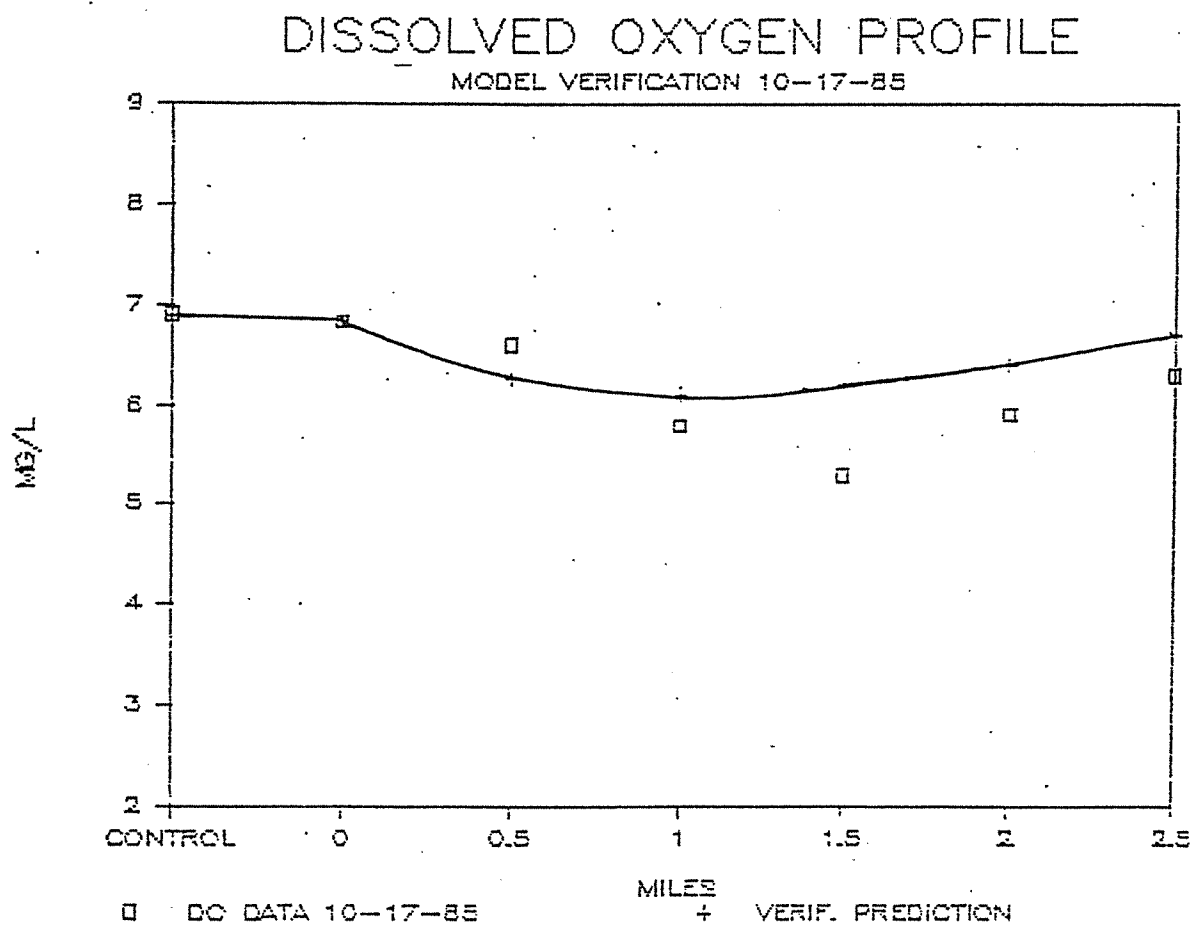


FIGURE 6

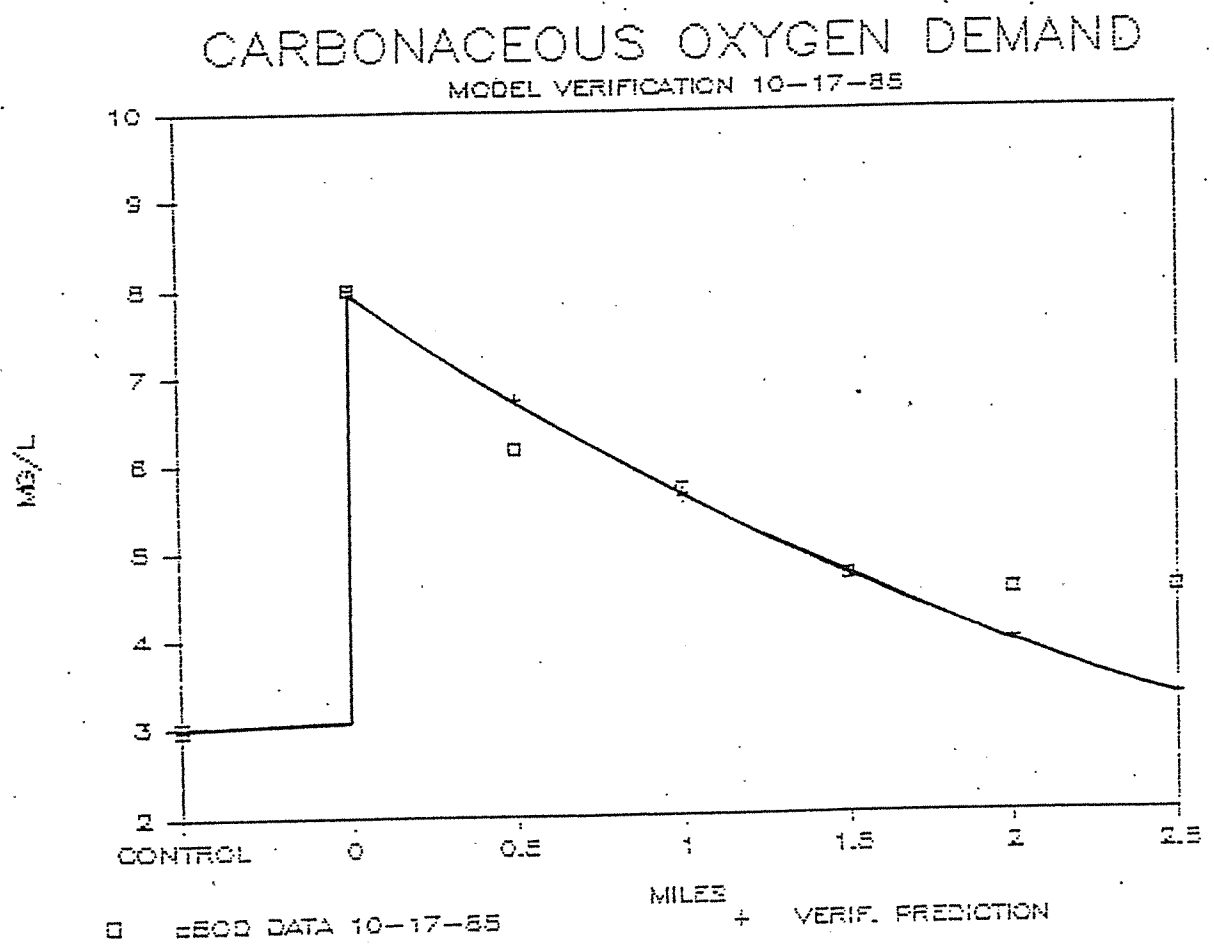
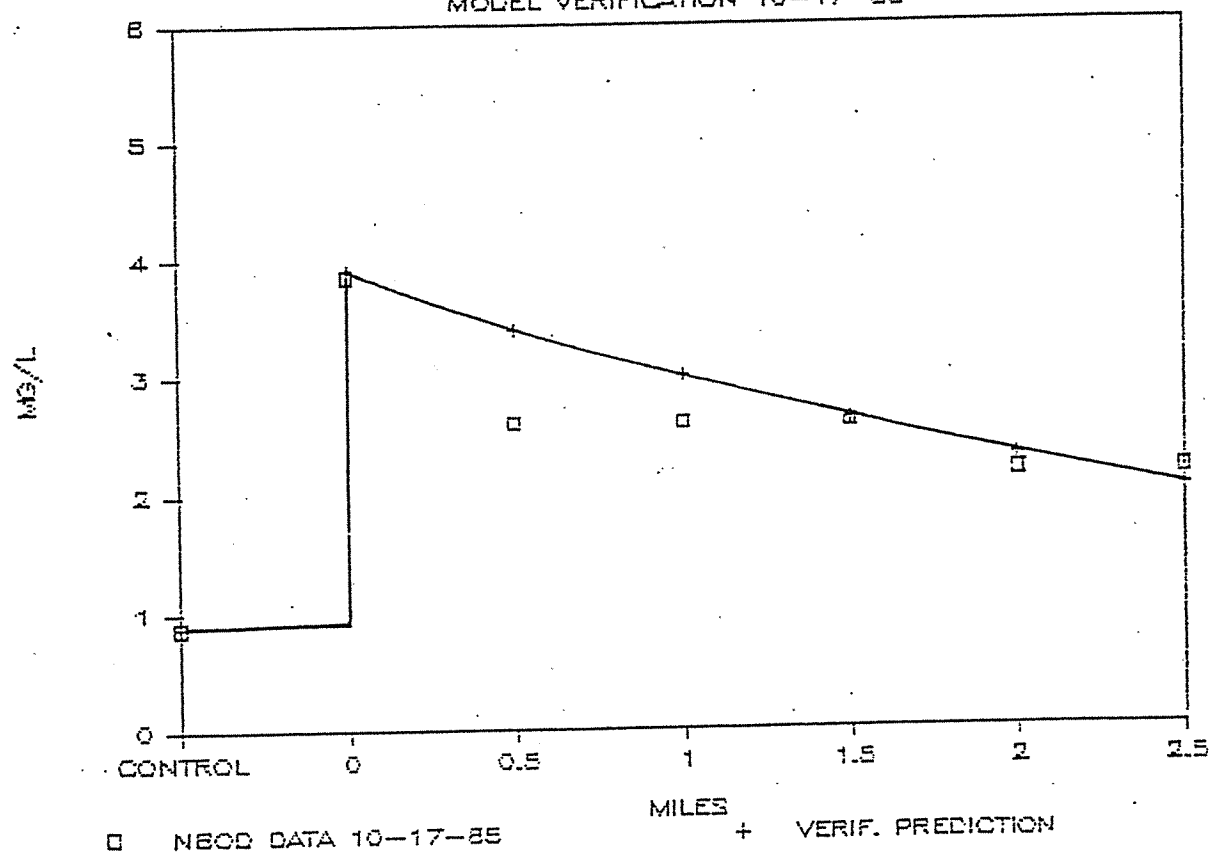


FIGURE 7

# NITROGENOUS OXYGEN DEMAND.

MODEL VERIFICATION 10-17-85



## II. SURVEY DISCUSSION (con't)

Samples were collected at midstream locations when the dye color reached peak intensity. Dissolved oxygen, pH, temperature, chlorine residual were analyzed instantaneously in the field using a YSI Model 57 dissolved oxygen meter, an Orion Research Model 211 pH meter, and a field prepared chlorine residual test kit utilizing the iodometric test method. Samples were collected for Nitrogen, Total Phosphorus, Ortho Phosphorus, Ammonia, Nitrite, Nitrate, Total Organic Carbon (TOC), Suspended Solids, Chloride and Biochemical Oxygen Demand (BOD). These samples were immediately put on ice and shipped to the Virginia Department of General Services, Division of Consolidated Laboratory Services in Richmond.

The verification in-stream predictions are presented below:

Distance (mi.) from STP discharge	D.O. mg/l	BOD <sub>u</sub> mg/l	NOD <sub>u</sub> mg/l
0.0	6.84	7.99	3.85
0.5	6.27	6.70	3.39
1.0	6.11	5.61	2.98
1.5	6.20	4.70	2.62
2.0	6.40	3.94	2.30
2.5	6.67	3.30	2.02

#### VI. WASTE LOAD ALLOCATION

In order to comply with the Board's Water Quality Standard of 5.0 mg/l average dissolved oxygen concentration, effluent limitations more stringent than those for standard secondary plants are needed. As stated in the introduction, during the months of May through September (summer tier), more stringent than secondary limitations for BOD<sub>5</sub> and also limitations for Total Kjeldahl (TKN) will be required. During the months October through April (winter tier) the effluent limitations are the standard secondary BOD<sub>5</sub> limitation without a TKN limit.

A. SUMMER EFFLUENT TIER (May through September)

The data utilized in the model for the summer tier is presented below:

1. Stream Flow

Minimum of 7-day/10-year (Q7-10) flow (MGD) used in model consists of:

+9.90 MGD = 7-day/10-year flow at stream gage

+1.85 MGD = 7-day/10-year additional drainage area flow

-1.00 MGD = Design of Richlands Water Treatment Plant

-1.75 MGD = Assumed future water treatment plant withdrawal

8.50 MGD = Net Total Q7-10 Flow

2. Ratio of Effluent  $BOD_5$  to Effluent  $BOD_u$  (UBOD)

On 10/3/85, average $BOD_u$ of STP effluent	224.7	1.72
	$\frac{\text{average } BOD_u \text{ of STP effluent}}{\text{average } BOD_5 \text{ of STP effluent}} =$	$\frac{224.7}{130.7} =$

On 10/17/85, average $BOD_u$ of STP effluent	204.0	2.15
	$\frac{\text{average } BOD_u \text{ of STP effluent}}{\text{average } BOD_5 \text{ of STP effluent}} =$	$\frac{204.0}{94.8} =$

2.00 was chosen as the value for  $BOD_u$  to use in the model.

This value is within the range shown in the literature for  $\frac{BOD_u}{BOD_5}$  for secondary treatment plants and was, therefore, utilized.

3. Stream BOD<sub>u</sub> and NOD<sub>u</sub>

Review of the data from both surveys indicated that an in-stream control BOD<sub>u</sub> = 2.0 mg/l and an in-stream control NOD<sub>u</sub> = 0.5 mg/l seemed appropriate and were used in the model.

4. Effluent BOD, BOD<sub>u</sub>, NOD, NOD<sub>u</sub>

An STP effluent BOD<sub>5</sub> of 18 mg/l and an effluent BOD<sub>u</sub> of 18 mg/l x 2.00 = 36 mg/l were used. An STP effluent NOD of 6.0 mg/l and an effluent NOD<sub>u</sub> of 6.0 mg/l x 4.33 = 26.0 mg/l were used.

5. Stream Temperature and Dissolved Oxygen

Stream monitoring data for three water quality monitoring stations in the vicinity of the Richlands STP was retrieved from STORET from 1974 to present and evaluated. The data revealed that an in-stream temperature of 26°C was reached in July and August of 1970, July of 1972, May and June of 1976, and July of 1983. Data also exists that a fish kill downstream of the Richlands STP discharge occurred on August 23, 1983. At the time of the fish kill, the stream D.O. and temperature upstream of the discharge was 6.20 mg/l and 26°C, respectively. An in-stream temperature of 26°C and an in-stream D.O. of 6.20 mg/l were determined to be critical and were used in the model.

6. Stream Biological Decay Rate,  $K_r$ , Stream Reaeration Rate,  $K_2$ , and Stream Nitrogenous Decay Rate,  $K_n$

The  $K_r$  and  $K_n$  values obtained in calibrating the model were  $K_r = 3.8d^{-1}$  and  $K_n = 3.23d^{-1}$ . These values were obtained from the existing primary STP and are not reasonable for wastewater produced from the proposed secondary STP. Therefore, a  $K_r = 1.0d^{-1}$  and a  $K_n = 1.0d^{-1}$  at  $20^{\circ}C$  were chosen from the literature to use in the model. The  $K_2$  of  $8.0 d^{-1}$  obtained from the model calibration was used in the model.

7. Effluent Limitations Calculation

Utilizing the above criteria, it was determined that effluent limitations of 18 mg/l monthly average  $BOD_5$ , 9.0 mg/l monthly average TKN and 6.2 mg/l minimum dissolved oxygen were necessary to maintain the Board's Water Quality Standards requirement of 5.0 mg/l average in-stream dissolved oxygen (for mountainous streams). The model predicted that an effluent TKN of 6.0 mg/l was required. However, review of the literature indicates that 3.0 mg/l of residual TKN that does not oxidize may be added to the 6.0 mg/l. Data used in the modeling calculation is summarized below:

CONTROL STREAM CONDITIONS:

Flow = 8.5 MGD D.O. = 6.2 mg/l  $BOD_u = 2.0$  mg/l  $NOD_u =$   
0.5 mg/l

VARIABLES FOR MODEL:

The k rates shown are at 20 degrees C. The model temperature corrected them using formulas for temperature correction in Attachment A.

$K_2 = 8.0d^{-1}$   $K_r = 1.0d^{-1}$   $K_n = 1.0d^{-1}$  Saturation D.O. =  
7.79 mg/l Length = 2.5 mi. Velocity = 2.5 mi./day Temp.  
= 26°C Elev. = 1900 ft.

CONDITIONS OF SEWAGE TREATMENT PLANT EFFLUENT:

Flow = 4.0 MGD D.O. = 6.2 mg/l  $BOD_u = 36.0$  mg/l  $NOD_u =$   
26.0 mg/l

The Streeter-Phelps equation predicted that the lowest in-stream dissolved oxygen, D.O. at sag, of 5.22 mg/l will occur approximately 0.5 miles downstream of the STP discharge. This minimum dissolved oxygen does not violate the 5.0 mg/l daily average D.O. required in the Board's Water Quality Standards. However, future municipal discharges may be prohibited or severely limited in the affected area since the stream's assimilative capacity will be almost completely utilized by the Richlands STP. The in-stream predictions of this modeling calculation are summarized below:

Results of Model

Total Distance (mi.) from STP discharge	D.O. mg/l	BOD <sub>u</sub> mg/l	NOD <sub>u</sub> mg/l
0.0	6.20	12.88	8.66
0.5	5.22	9.90	6.30
1.0	5.64	7.60	4.59
1.5	6.14	5.84	3.34
2.0	6.55	4.49	2.43
2.5	6.85	3.45	1.77

TABLE THREE

Clinch River Temperature Data at Ambient Monitoring Station #315  
Approximately 1.0 mile below the Richlands STP:

Mo.	74	75	76	77	78	79	80	81	82	83	84	85	Monthly Ave.
1	10	1	1	ID*					0	0		5	2.78
2	7	6				2	3	6	4	0		9	4.03
3	12	9	8			11	9	4	13	14	10	10	9.99
4	19	6				11	14	10	15	9	10	6	9.95
5		14	17			16	16	14	23	16	14	17	16.34
6		21	22			15	19	17	21	24	21	21	20.14
7	23	21	21			22		23	24	26	22	18	20.05
8		21	21			20		25	24	24	23		19.78
9		22	16			16		22	13	20	20		16.10
10	14	14	11			11	17	15	16	18	11		14.21
11	6	13	5			8	6	7	9	12	5		7.93
12		7	7			6	4		12				7.18

\*ID - inaccurate data

## B. WINTER EFFLUENT TIER (October through April)

The basis for the winter tier is presented below:

### 1. Basis for Tiers

Temperature, rather than stream flow, was the parameter that was evaluated to determine permit tiers, since stream flow fluctuates greatly over the years of record for any particular month, and since the Q7-10 flow can occur in any month. Monthly temperature, however, is relatively constant from year to year. Stream monitoring data, retrieved from STORET, was evaluated from 1974 to the present to determine the average monthly temperatures in the Clinch River downstream of the Richlands STP. The temperature data revealed a rather consistent pattern, as indicated in Table THREE and Figure 9.

### 2. Effluent Limitation Calculations

Utilizing the temperature data, a stream temperature of 16°C was first tried as the tier temperature at which the effluent limitations for TKN would not apply. Review of the stream monitoring data indicated that a control D.O. = 7.4 mg/l was appropriate to use at a temperature of 16°C.

All other data used in the summer effluent tier model was also used in the winter effluent tier model, with the exception of effluent  $BOD_5$  and effluent TKN. An effluent  $BOD_5$  of 30 mg/l and an effluent  $BOD_u$  of  $30 \times 2 = 60$  mg/l were used. An STP effluent NOD of 20.0 mg/l and an effluent  $NOD_u$  of  $20 \times 4.33 = 86.6$  mg/l were used.

Data used in this modeling calculation is summarized below:

CONTROL STREAM CONDITIONS:

Flow = 8.5 MGD   D.O. = 7.4 mg/l    $BOD_u = 2.0$  mg/l    $NOD_u = 0.5$  mg/l

VARIABLES FOR MODEL:

The k rates shown are at 20 degrees C. The model temperature corrected them using the formulas for temperature correction in Attachment A.

$K_2 = 8.0d^{-1}$     $K_r = 1.0d^{-1}$     $K_n = 1.0d^{-1}$    Saturation D.O. = 9.21 mg/l   Length = 2.5 mi.   Velocity = 4.5 mi./day   Temp. =  $16^{\circ}C$    Elev. = 1900 ft.

CONDITIONS FOR SEWAGE TREATMENT EFFLUENT:

Flow = 4.0 MGD   D.O. = 6.2 mg/l    $BOD_u = 60.0$  mg/l    $NOD_u = 86.6$  mg/l (assumed)

With these parameters, the Streeter-Phelps equation predicted that a minimum in-stream dissolved oxygen, D.O. (at sag), of 5.03 mg/l will occur at approximately 1.0 mile downstream of the discharge. This minimum D.O. will not violate the Board's Water Quality Standards requirement of 5.0 mg/l daily average D.O. for mountainous streams. Therefore, a TKN effluent limitation tier should be utilized, beginning at a stream temperature of 16°C.

For the months of May through September, the average monthly temperatures are greater than 16°C, and a TKN effluent monthly average limitation of 2.0 mg/l will apply. For the months of October through April, the average monthly temperatures are less than 16°C, and the TKN effluent limitations will not apply.

The in-stream predictions of this modeling calculation are summarized below:

Total distance (mi.) from plant	D.O. mg/l	BOD <sub>u</sub> mg/l	NOD <sub>u</sub> mg/l
0.0	7.02	20.56	28.05
0.5	5.49	18.74	25.85
1.0	5.03	17.09	23.82
1.5	5.03	15.58	21.96
2.0	5.23	14.20	20.23
2.5	5.49	12.95	18.65

FIGURE 8

# DO PROFILE FOR 4 MGD RICHLANDS PLANT

Summer and Winter Limitations

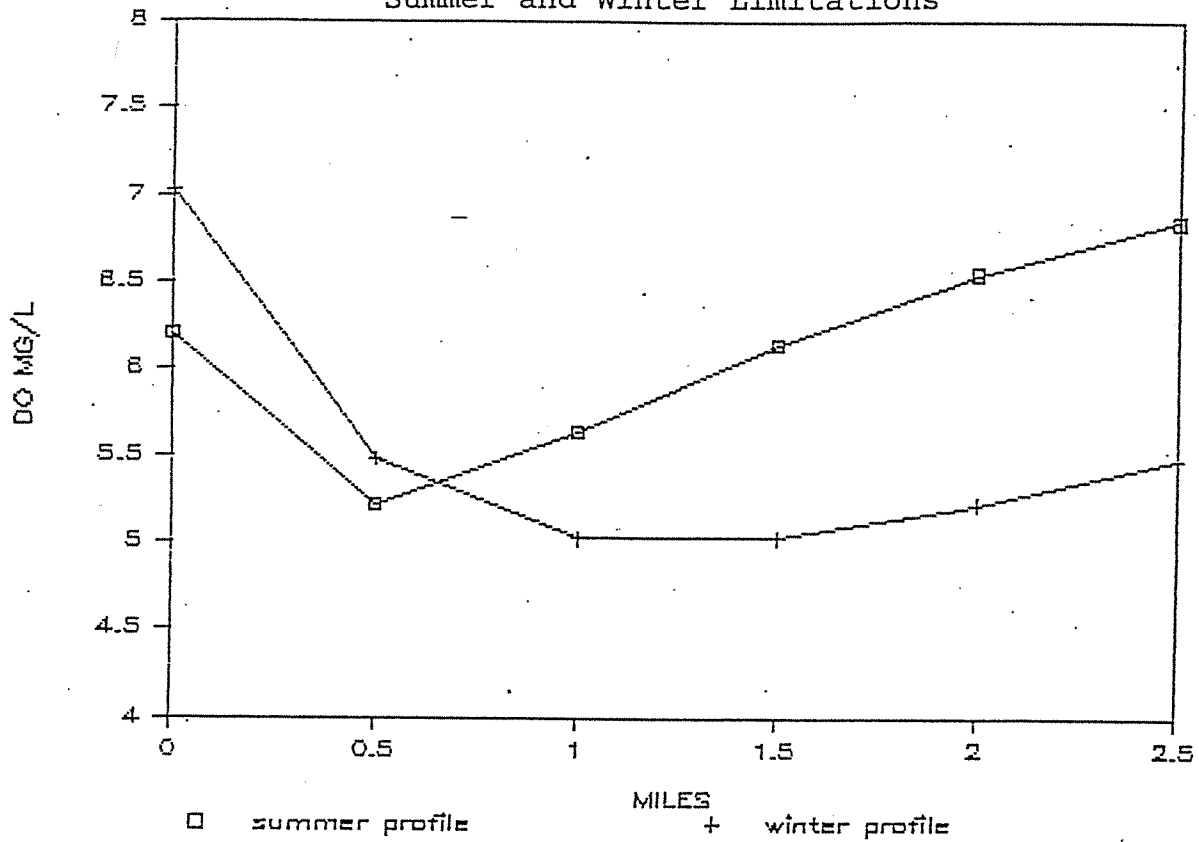
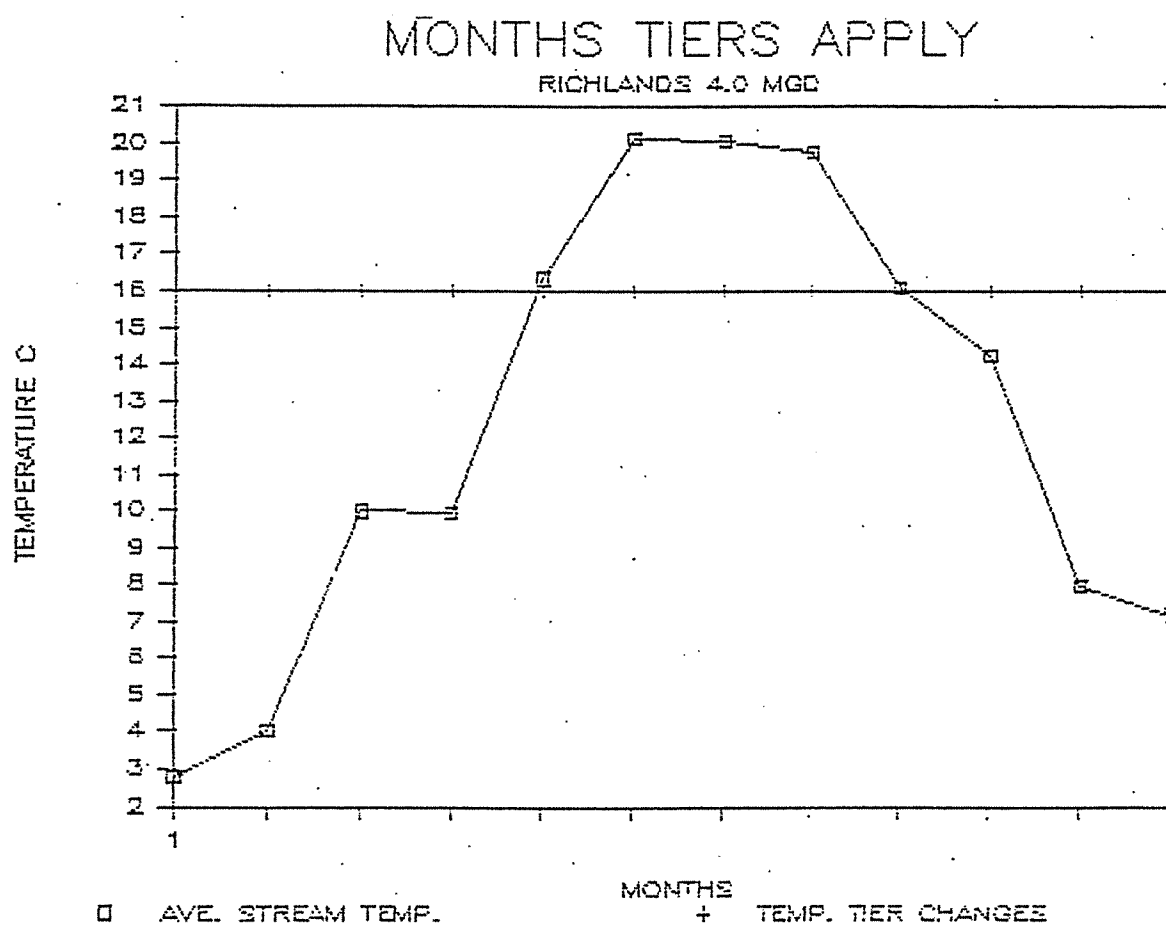


FIGURE 9.



## VII. SENSITIVITY ANALYSIS

An analysis was performed to access the sensitivity of the model results by varying one of the k rates while holding the other two k rates constant. The  $K_2$  rate was varied 25% and the  $K_1$  and  $K_2$  rates were varied 25-50% from the original values. The results are presented below:

### Summer Tier:

#### CONTROL STREAM CONDITIONS:

Flow = 8.5 MGD D.O. = 6.2 mg/l  $BOD_u = 2$  mg/l  $NOD_u = 0.5$  mg/l

#### VARIABLES FOR THE MODEL:

Saturation D.O. = 7.79 Temp. = 26°C Elev. = 1900 ft.

#### CONDITIONS FOR THE SEWAGE TREATMENT PLANT:

Flow = 4 MGD D.O. = 6.2 mg/l  $BOD_u = 60$  mg/l  $NOD_u = 8.66$  mg/l

Distance (mi.) from STP discharge	In-Stream Dissolved Oxygen mg/l		
	$K_2 = 6$ $K_1 = 1$ $Kn = 1$	$K_2 = 8$ $K_1 = 1.5$ $Kn = 1$	$K_2 = 8$ $K_1 = 1$ $Kn = 1.5$
0	6.20	6.20	6.20
0.5	4.60	4.72	4.85
1.0	4.90	5.35	5.46
1.5	5.50	6.05	6.12
2.0	6.04	6.57	6.60
2.5	6.46	6.94	6.94

Winter tier:

CONTROL STREAM CONDITIONS:

Flow = 8.5 MGD D.O. = 7.4 BOD<sub>u</sub> = 2.0 mg/l NOD<sub>u</sub> = 0.5 mg/l

VARIABLES FOR MODEL:

Saturation D.O. = 9.21 Temp. = 16°C Elev. = 1900 ft.

CONDITIONS FOR THE SEWAGE TREATMENT PLANT:

Flow = 4 MGD D.O. = 6.2 mg/l BOD<sub>u</sub> = 60.0 mg/l NOD<sub>u</sub> = 86.6  
mg/l

Distance (mi.) from STP dis- charge	In-Stream Dissolved Oxygen mg/l		
	K <sub>2</sub> = 6 K <sub>1</sub> = 1 K <sub>n</sub> = 1	K <sub>2</sub> = 8 K <sub>1</sub> = 1.25 K <sub>n</sub> = 1	K <sub>2</sub> = 8 K <sub>1</sub> = 1.25 K <sub>n</sub> = 1.25
0	7.02	7.02	7.02
0.5	5.01	5.20	5.13
1.0	4.16	4.67	4.58
1.5	3.92	4.69	4.59
2.0	4.00	4.93	4.84
2.5	4.24	5.25	5.16

The sensitivity analysis revealed that varying any of the k rates by 25-50% caused, at most, an additional one milligram per liter decrease in the dissolved oxygen. Although this degree of variation is marginally acceptable for a waste load allocation, the staff feels that the sensitivity analysis reflects enough uncertainty in the model to justify requiring the Town of Richlands to institute an in-stream dissolved oxygen monitoring program. The requirements for this monitoring program will be included in the NPDES Permit in a Special Condition. This monitoring program will consist of two phases.

The first phase will consist of daily monitoring of the following:

1. Stream flowrate measured at the USGS gaging station at Richlands upstream of the Richlands Sewage Treatment Plant.
2. In-stream temperature in °C in the stream at the discharge point.

For each day during the months of May through September, that the stream flowrate is 12.0 MGD or less, and the in-stream temperature is 24°C or greater, the Town will immediately implement the second phase of the monitoring program in addition to the first phase. Also, for each day during the month of October through April, that the stream flowrate is 12.0 MGD or less, the Town will immediately implement the second phase of the monitoring program in addition to the first phase. This second phase will consist of dissolved oxygen sampling. The Dissolved Oxygen samples will be taken at midstream at the following stations on the Clinch River:

0.25 mile

0.50 mile

0.75 mile

1.0 mile

1.25 miles

1.50 miles

downstream of the outfall.

The data sets for each survey will be submitted as an attachment to the Discharge Monitoring Report for each month the surveys are conducted.

Should the Board determine that Water Quality Standards are being violated, the Board will modify the effluent limitations in the Permit to the extent necessary to maintain Water Quality Standards and will notify the Town that additional treatment facilities will be required. The Town will provide additional treatment facilities in accordance with a construction schedule included in the Special Condition in the Permit.

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

SOUTHWEST REGIONAL OFFICE

P.O. BOX 1688

ABINGDON, VA. 24212

SUBJECT: Monitoring Reduction Request of Town of Richlands  
WWTP, VPDES Permit No. VA0021199

TO: File

FROM: Charles Gates

DATE: March 26, 1997

COPIES: A. J. Newman  
Fred M. Wyatt  
Larry K. Owens

SWRO received on January 31, 1997, a request for reduced monitoring frequencies in the permit to be reissued for the Town of Richlands WWTP, submitted by Dave Fields, Chief Operator. This request was made in accordance with Robert Perciasepe's, U. S. Environmental Protection Agency, memorandum "Interim Guidance for Performance - Based Reductions of NPDES Permit Monitoring Frequencies", April 19, 1996 which allows reduction of permit parameter monitoring frequencies for facilities which consistently meet permit limitations without violation. The degree of monitoring reduction is based on the percentage range that the long term effluent average is under the effluent limit (see attached chart).

Data submitted by Richlands WWTP covers the period January, 1993 through December, 1996. No permit effluent violations were issued during this period. The permit effective date was August 24, 1992 and the permit expires on August 24, 1997. No NOV's have been issued for exceeding permit limitations for any parameter during this permit cycle.

Portions of the forty-eight individual Lotus 123 monthly spreadsheets submitted were combined into one spreadsheet and the long term effluent average (LTEA), maximum, minimum, standard deviation, and coefficient of variation were calculated for the forty-eight month period. Parameters considered for monitoring reductions were BOD<sub>5</sub>, TSS, Fecal Coliform, and Ammonia Nitrogen. In the data review the majority of the ammonia nitrogen values were reported as zero. These values were replaced with the minimum detection level

Richlands WWTP  
Performance Based Monitoring Reduction  
Page 2

for ammonia nitrogen which is 0.2 mg/L. The data was also segregated into the months for the wet season and dry season tiers and data was compared to the tiered limitations for the periods. Reduction of monitoring frequencies were considered for the above referenced parameters by comparing the LTEA to the monthly average limitations (MAL). The obtained ratios were then compared to EPA's Table 1 (attached) and the monitoring frequencies were reduced accordingly.

The currently required monitoring frequencies and the proposed reduced monitoring frequencies are as follows:

	<u>CURRENT REQUIREMENT</u>	<u>REDUCED MONITORING REQUIREMENT</u>
BOD <sub>5</sub>	7 days/week	1 day/week
TSS	7 days/week	1 day/week
NH <sub>3</sub> -N	2/month	1/quarter
Fecal Coliform	3/week	1/week

Data summary for Richlands WWTP Wet Season Tier 1/1/93 - 12/31/96 is as follows:

	<u>BOD<sub>5</sub></u>	<u>TSS</u>	<u>NH<sub>3</sub>-N</u>	<u>Fecal Coliform</u>
Minimum	0.8	0.1	0.2	1.0
Maximum	24.6	29.0	2.6	750.0
Average	5.06	4.23	0.32	46.43
Std. Dev.	3.791	3.654	0.438	73.199
Coeff. Var.	74.857	86.317	136.175	157.655
Ratio LTEA/MAL	16.9%	14.1%	3.1%	23.2%

No effluent violations occurred during this time period.

Richlands WWTP  
Performance Based Monitoring Reduction  
Page 3

Data summary for Richlands WWTP Dry Season Tier 6/1/93 - 11/30/96 is as follows:

	<u>BOD<sub>5</sub></u>	<u>TSS</u>	<u>NH<sub>3</sub>-N</u>	<u>Fecal Coliform</u>
Minimum	0.1	0.2	0.2	1.0
Maximum	13.0	13.0	2.0	360.0
Average	2.27	2.24	0.25	56.1
Std. Dev.	1.675	1.500	0.274	70.719
Coeff. Var.	73.825	67.050	109.136	126.168
Ratio LTEA/MAL	12.6%	7.5%	5.6%	28.0%

No effluent violations occurred during this time period.

**Table 1**

**Ratio of Long Term Effluent Average  
to Monthly Average Limit**

<u>Baseline Monitoring</u>	<u>75-66%</u>	<u>65-50%</u>	<u>49-25%</u>	<u>&lt;25%</u>
7/wk	5/wk	4/wk	3/wk	1/wk
6/wk	4/wk	3/wk	2/wk	1/wk
5/wk	4/wk	3/wk	2/wk	1/wk
4/wk	3/wk	2/wk	1/wk	1/wk
3/wk	3/wk	2/wk	1/wk	1/wk
2/wk	2/wk	1/wk	2/mo	1/mo
1/wk	1/wk	1/wk	2/mo	1/2mos
2/month	2/mo	2/mo	2/mo	1/quarter
1/month	1/mo	1/mo	1/quarter	1/6mos



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY SOUTHWEST REGIONAL OFFICE

L. Preston Bryant, Jr.  
Secretary of Natural Resources

355 Deadmore Street, P.O. Box 1688, Abingdon, Virginia 24212  
(276) 676-4800 Fax (276) 676-4899  
[www.deq.virginia.gov](http://www.deq.virginia.gov)

David K. Paylor  
Director

Michael D. Overstreet  
Regional Director

November 6, 2007

Mr. Timothy Taylor  
Town Manager  
Town of Richlands  
200 Washington Square  
Richlands, VA 24641

Re: Fecal Coliform/E.Coli Study at Richlands Regional WWTP, VA0021199


Dear Mr. Taylor:

We have evaluated the results of the fecal coliform/E.coli study conducted during August- September, 2007.

We have evaluated the data and we feel that the facility can consistently meet the E.coli standard. Therefore, the final E. coli limitation in Part 1.B.3.b. of the permit is now effective.

Enclosed is a revised discharge monitoring report form (DMR) which contains the E.coli parameter instead of the fecal coliform parameter. Please begin E. coli monitoring on December 1, 2007, with the new DMR being due January 10, 2008, for the month of December. Please call me at (276) 676-4804 or Fred Wyatt at (276) 676-4810, if you have any questions or if we can be of assistance.

Sincerely,

  
Allen J. Newman, P.E.  
Water Permit Manager

Enclosure

Copy: Dave H. Fields, Town of Richlands  
OWPP  
EPA, Region III - 3WP12  
Bob Doss, DEQ  
Ruby Scott, DEQ



# Town of Richlands



200 Washington Square

Richlands, VA 24641

PHONE (276) 964-2569 - FAX (276) 963-2889

Received

NOV 01 2007

DEQ-SWRO

October 25, 2007

Southwest Regional Office  
Department of Environmental Quality  
355 Deadmore Street  
Abingdon, VA 24212-1688

Dear Sir or Madam:

Enclosed are the fecal coliform and *E. coli* data for samples collected from August 1, 2007 to September 5, 2007, as requested by our permit.

Sample	Date Collected	Time Collected	Flow, MGD	<i>E. coli</i> MPN/dl	Fecal count/dl
1	8/1/2007	3:02	2.13	5	14
2	8/3/2007	3:30	4.58	85.7	41
3	8/6/2007	3:35	1.86	3	1
4	8/8/2007	3:30	2.48	2	1
5	8/10/2007	3:55	2.11	3	1
6	8/13/2007	3:58	1.41	11	3
7	8/15/2007	3:37	1.33	75.7	15
8	8/17/2007	1:00	1.97	40.8	21
9	8/20/2007	3:59	1.20	10.5	5
10	8/22/2007	4:00	1.63	16.4	14
11	8/24/2007	3:20	1.52	99.1	45
12	8/27/2007	3:45	1.53	87.8	45
13	8/29/2007	3:25	1.13	57.1	49
14	8/31/2007	3:18	1.63	88.2	44
15	9/3/2007	1:20	1.59	24.6	18
16	9/5/2007	3:35	1.50	21.1	6
Geometric Mean				20.6	10

If we can be of further assistance, please let us know.

Sincerely,

*Dave H. Fields*

Dave H. Fields,  
Chief Operator

## ATTACHMENT 2-a

### WET Limits Calculations and WET Testing Summary

[illegible]

[illegible]



Cell: I9

Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: K18

Comment: This is assuming that the data are Type 2 data (none of the data in the data set are censored - "<" or ">").

Cell: J22

Comment: Remember to change the "N" to "Y" if you have ratios entered. otherwise, they won't be used in the calculations.

Cell: C40

Comment: If you have entered data to calculate an ACR on page 3, and this is still defaulted to "10", make sure you have selected "Y" in cell E21

Cell: C41

Comment: If you have entered data to calculate an effluent specific CV on page 2, and this is still defaulted to "0.6", make sure you have selected "Y" in cell E20

Cell: L48

Comment: See Row 151 for the appropriate dilution series to use for these NOEC's

Cell: G62

Comment:

Vertebrates are:

Pimephales promelas  
Oncomyrichus mykiss  
Cyprinodon variegatus

Cell: J62

Comment:

Invertebrates are:

Ceriodaphnia dubia  
Mysidopsis bahia

Cell: C117

Comment: Vertebrates are:

Pimephales promelas  
Cyprinodon variegatus

Cell: M119

Comment: The ACR has been picked up from cell C34 on Page 1. If you have paired data to calculate an ACR, enter it in the tables to the left, and make sure you have a "Y" in cell E21 on Page 1. Otherwise, the default of 10 will be used to convert your acute data.

Cell: M121

Comment: If you are only concerned with acute data, you can enter it in the NOEC column for conversion and the number calculated will be equivalent to the T<sub>Ua</sub>. The calculation is the same: 100/NOEC = T<sub>Uc</sub> or 100/LC50 = T<sub>Ua</sub>.

Cell: C138

Comment: Invertebrates are:

Ceriodaphnia dubia  
Mysidopsis bahia

Table 1.  
 TMP Summary Test Results  
 Town of Richlands WWTP  
 VPDES Permit No. VA002119  
 08/25/07 - 08/24/12

Test Results for Outfall 001 (all samples are 24 hr flow proportional composites)

TEST DATE		TEST TYPE/ORGANISM	LC <sub>50</sub>	NOEC	% Survival	NOTES	Lab
09/11/07--09/18/07 Received 11/9/07	AN-2007	Chronic <u>P. promelas</u>	NA	100% S&G	87.5 %	Pass	TSAL
09/11/07--09/19/07 Received 11/9/07		Chronic <u>C. dubia</u>	NA	100% S&R	100 %	Pass	TSAL
09/16/08--09/23/08 Received 10/09/08	AN-2008	Chronic <u>P. promelas</u>	NA	100% S&G	100 %	Pass	GPL
09/16/08--09/24/08 Received 10/09/08		Chronic <u>C. dubia</u>	NA	100% S 19% R	100 %	Pass	GPL
09/15/09--09/22/09 Received 11/05/09	AN-2009	Chronic <u>P. promelas</u>	NA	100% S&G	97.5 %	Pass	GPL
09/15/09--09/23/09 Received 11/05/09		Chronic <u>C. dubia</u>	NA	100% S&R	100 %	Pass	GPL
08/17/10--08/24/10 Received 10/12/10	AN-2010	Chronic <u>P. promelas</u>	NA	100% S&G	82.5%	Pass	M-TC
08/17/10--08/25/10 Received 10/12/10		Chronic <u>C. dubia</u>	NA	100% S&R	100 %	Pass	M-TC
08/23/11--08/30/11 Received 10/13/11	AN-2011	Chronic <u>P. promelas</u>	NA	100% S&G	100%	Pass	M-TC
08/23/11--08/31/11 Received 10/13/11		Chronic <u>C. dubia</u>	NA	100% S&R	100 %	Pass	M-TC

%Survival is the percent survival in 100% effluent at the end of the test period.

ABBREVIATIONS: AN = Annual tests  
QT = Quarterly test  
TSLA = Tri-State Analytical Lab  
GPL = GPL Laboratories TN, L.L.C.  
M-TC = Microbac Tri-Cities  
R = Reproduction  
G = Growth  
S = Survival

Annual Test No. 1 Chronic tests passed the criteria contained in the VPDES Permit issued 8/24/07. Next test results due by 10/10/08.

Annual Test No. 2 Chronic tests passed the criteria contained in the VPDES Permit issued 8/24/07. Next test results due by 10/10/09.

Annual Test No. 3 Chronic tests passed the criteria contained in the VPDES Permit issued 8/24/07. Next test results due by 10/10/10.

Annual Test No. 4 Chronic tests passed the criteria contained in the VPDES Permit issued 8/24/07. Next test results due by 10/10/11.

Annual Test No. 5 Chronic tests passed the criteria contained in the VPDES Permit issued 8/24/07. This is the final test for the permit effective 08/25/07 - 08/24/12. *Permit will be reissued during 2012.*

## ATTACHMENT 3

### Threatened & Endangered Species Information

## Wyatt, Frederick (DEQ)

---

**From:** nhreview (DCR)  
**Sent:** Monday, March 05, 2012 5:39 PM  
**To:** Wyatt, Frederick (DEQ)  
**Cc:** ProjectReview (DGIF); kimberly\_smith@fws.gov  
**Subject:** VA0021199, Richlands WTP  
**Attachments:** 61880, DEQ VA0021199, Richlands WTP.pdf

Mr. Wyatt,

Please find attached the Department of Conservation and Recreation, Division of Natural Heritage (DCR-DNH) comments for the above referenced project. The comments are in pdf format and can be printed for your records. Also species rank information is available at [http://www.dcr.virginia.gov/natural\\_heritage/help.shtml](http://www.dcr.virginia.gov/natural_heritage/help.shtml) for your reference.

Please send a confirmation e-mail upon receipt of our comments. Let us know if you have any questions.

Thank you for the opportunity to comment on this project

S. Rene' Hypes  
Project Review Coordinator  
DCR-DNH  
217 Governor Street  
Richmond, Virginia 23219  
804-371-2708 (phone)  
804-371-2674 (fax)  
[rene.hypes@dcr.virginia.gov](mailto:rene.hypes@dcr.virginia.gov)



**Conserving VA's Biodiversity through  
Inventory, Protection and Stewardship**  
[www.dcr.virginia.gov/natural\\_heritage](http://www.dcr.virginia.gov/natural_heritage)  
[Virginia Natural Heritage Program on Facebook](#)

Douglas W. Domenech  
Secretary of Natural Resources



David A. Johnson  
Director

COMMONWEALTH of VIRGINIA  
DEPARTMENT OF CONSERVATION AND RECREATION

Division of Natural Heritage  
217 Governor Street  
Richmond, Virginia 23219-2010  
(804) 786-7951

March 5, 2012

Fred Wyatt  
DEQ-SRO  
P.O. Box 1688  
Abingdon, VA 24211

Re: VA0021199, Richlands WTP

Dear Mr. Wyatt:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Bluestone-Clinch River-Indian Creek-Big Branch Stream Conservation Unit is within the project site. Stream Conservation Units (SCUs) identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Bluestone-Clinch River-Indian Creek-Big Branch SCU has been given a biodiversity ranking of B2, which represents a site of very high significance. Natural heritage resources associated with this site are:

<i>Pleurobema oviforme</i>	Tennessee clubshell	G2G3/S2S3/NL/NL
<i>Leptoxis praerosa</i>	Onxy Rocksnail	G5/S1S3/NL/NL
<i>Fusconaia barnesiana</i>	Tennessee pigtoe	G2G3/S2/NL/NL
<i>Alasmidonta viridis</i>	Slippershell mussel	G4G5/S1/NL/LE
<i>Lasmigona holstonia</i>	Tennessee heelsplitter	G3/S1/NL/LE
<i>Epioblasma florentina walkeri</i>	Tan riffleshell	G1T1/S1/LE/LE
<i>Quadrula cylindrical strigillata</i>	Rough rabbits foot	G3G4T2/S2/LE/LE
<i>Lexingtonia dolabelloides</i>	Slabside pearlymussel	G2/S2/C/LT
<i>Pegias fabula</i>	Litte-winged pearlymussel	G1/S1/LE/LE
<i>Fusconia cor</i>	Shiny pigtoe	G1/S1/LE/LE
<i>Epioblasma capseformis</i>	Oyster mussel	G1/S1/LE/LE
<i>Villosa perpurpurea</i>	Purple bean	G1/S1/LE/LE

State Parks • Stormwater Management • Outdoor Recreation Planning  
Natural Heritage • Dam Safety and Floodplain Management • Land Conservation

<i>Pythobranchius subtentum</i>	Fluted kidneyshell	G2/S2/C/NL
<i>Cumberlandia monodonta</i>	Spectacle case	G3/S1/C/LE
<i>Cryptobranchius alleganiensis</i>	Hellbender	G3G4/S2S3/SOC/NL
<i>Chrosomus sp. 1</i>	Clinch dace	G1/S1/SOC/NL
<i>Notropis spectrunculus</i>	Mirror shiner	G4/S2/NL/NL
<i>Cambarus sciotoensis</i>	Scioto crayfish	G5/S2S3/NL/NL

In addition, Clinch River has been designated by the Virginia Department of Game and Inland Fisheries (VDGIF) as a "Threatened and Endangered Species Water". There are 35 species associated with this T&E Water.

To minimize impacts to aquatic resources, DCR recommends the use of uv/ozone to replace chlorination disinfection and utilization of new technologies as they become available to improve water quality. Due to the legal status of several of the natural heritage resources associated with this site, DCR also recommends coordination with the U.S. Fish and Wildlife Service (USFWS) and the VDGIF to ensure compliance with protected species legislation.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

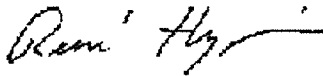
Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Department of Conservation and Recreation (DCR), DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The Virginia Department of Game and Inland Fisheries maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from <http://vafwis.org/fwis/> or contact Shirl Dressler at (804) 367-6913.

Should you have any questions or concerns, feel free to contact me at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,



S. Rene' Hypes  
Project Review Coordinator

CC: Kim Smith, USFWS  
Ernie Aschenbach, VDGIF

## Wyatt, Frederick (DEQ)

---

**From:** gis@timmons.com  
**Sent:** Thursday, March 01, 2012 8:51 AM  
**To:** nhwebreview (DCR); Wyatt, Frederick (DEQ)  
**Subject:** Richlands WWTP - frederick.wyatt@deq.virginia.gov  
**Attachments:** DCR\_NH\_REPORT.pdf

Thank you for submitting your project to DCR Natural Heritage. Attached is an overview of the results and potential conflicts.



Department of Conservation & Recreation

CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

**WebID:** W634661886220000000

**Client Project Number:** VA0021199

---

## **PROJECT INFORMATION**

**TITLE:** Richlands WWTP

**DESCRIPTION:** Reissuance of 4.0 MGD VPDES permit

**EXISTING SITE CONDITIONS:** Existing discharge to the Clinch River with calculated complete mix at 2400 ft

**QUADRANGLES:** RICHLANDS

**COUNTIES:** Tazewell

**Latitude/Longitude (DMS):** 370529/814956

**Acreage:** 12

**Comments:** No proposed upgrades or expansion are planned for this facility. Complete mix calculated at 7Q10 of 10.87 MGD and 1Q10 of 7.63 MGD

---

## **REQUESTOR INFORMATION**

**Priority:** No      **Tier Level:** 2      **Tax ID:**

**Contact Name:** Fred Wyatt

**Company Name:** DEQ-Southwest Regional Office

**Address:** PO Box 1688

**City:** Abingdon      **State:** VA

**Zip:** 24212

**Phone:** 276-676-4810      **Fax:** 276-676-4899

**Email:** frederick.wyatt@deq.virginia.gov

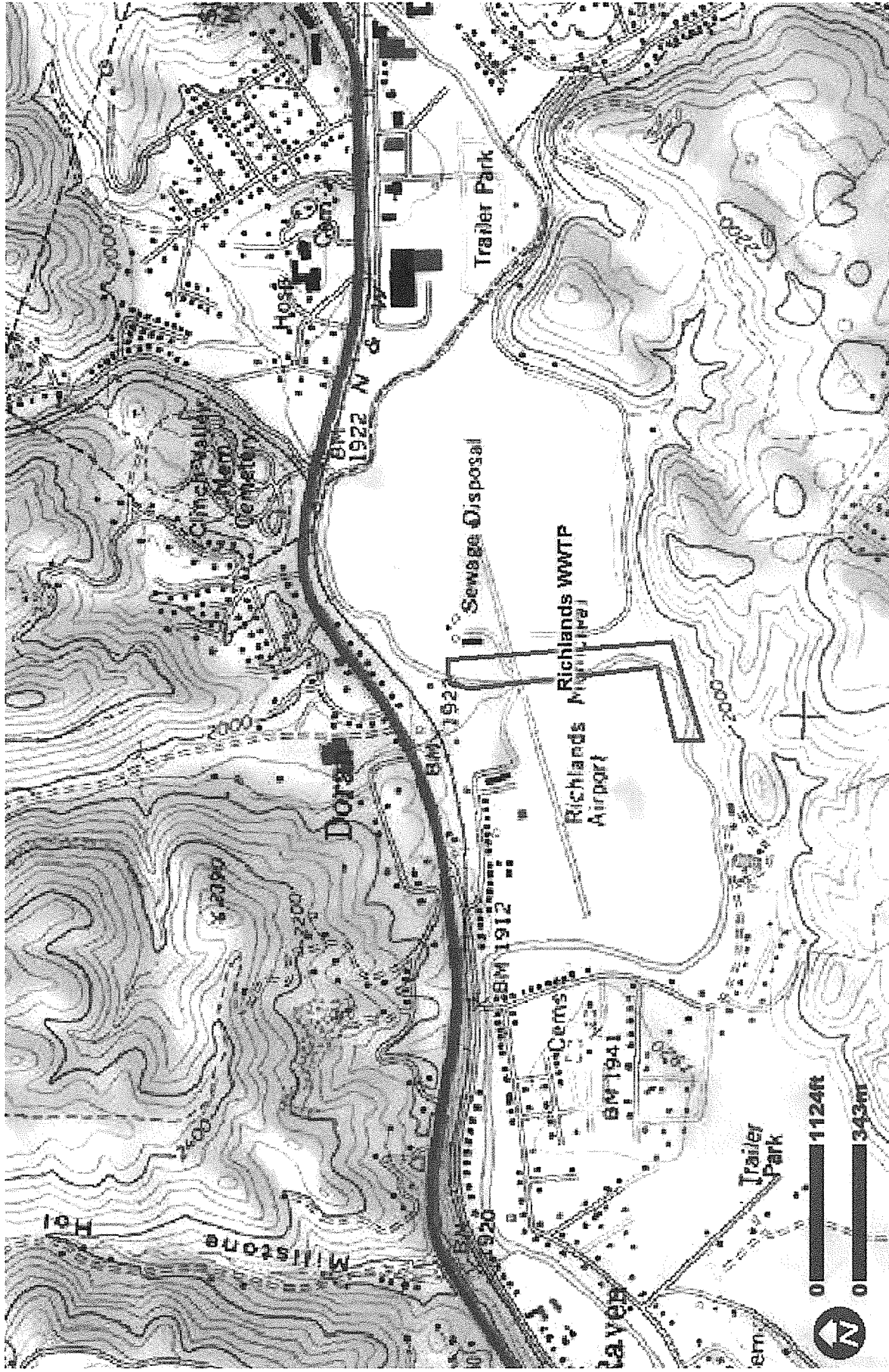
Conservation Site Name	Site Type	Bank	Acreage	Listed Species Presence
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	GLNHR			SL
	GLNHR			FL
	GLNHR			NL
	GLNHR			SL
	GLNHR			NL
	SCU	B2	372	FL
Natural Heritage Conservation Sites within Search Radius				

Site-Name	Group-Name	common-name	scientific-name	GRANK	SRANK	Fed Status	st status	EO Rank	last obs date	precision
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Invertebrate Animal	Elktoe	Alasmidonta marginata	G4	S1S2			X	1912-09-20	M
	Invertebrate Animal	Oyster Mussel	Epioblasma capsaeformis	G1	S1	LE	LE	H	1918-	M
	Invertebrate Animal	Slippershell Mussel	Alasmidonta viridis	G4G5	S1		LE	X	ND	M
	Invertebrate Animal	Tennessee Heelsplitter	Lasmigona holstonia	G3	S1		LE	H	1965-	M
	Vascular Plant	Crested Sedge	Carex cristatella	G5	S2			H?	1983-07-29	G
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Invertebrate Animal	Fluted Kidneyshell	Ptychobranchus subtentum	G2	S2	C		E	2008-09-12	S
	Invertebrate Animal	Onyx Rocksnail	Leptoxis praerosa	G5	S1S3			E	2010-09-15	
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Invertebrate Animal	Purple Bean	Villosa perpurpurea	G1	S1	LE	LE	D	2005-06-27	S
	Invertebrate Animal	Rough Rabbits Foot	Quadrula cylindrica strigillata	G3G4T2	S2	LE	LE	D	1996-	S
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Invertebrate Animal	Slabside Pearl mussel	Lexingtonia dolabelloides	G2	S2	C	LT	E	1997	S

#### Natural Heritage Resources within Search Radius

Site-Name	Group-Name	common-name	scientific-name	GRANK	SRANK	Fed Status	st status	EO Rank	last obs date	precision
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Invertebrate Animal	Spiny Riversnail	<i>Io fluviatilis</i>	G2	S2	SOC	LT	H	2010-09-15	
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Invertebrate Animal	Tan Riffleshell	<i>Epioblasma florentina walkeri</i>	G1T1	S1	LE	LE	CD	2004-03-27	S
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Invertebrate Animal	Tennessee Clubshell	<i>Pleurobema oviforme</i>	G2G3	S2S3	SOC		CD	2007-09-26	S
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Invertebrate Animal	Tennessee Pigtoe	<i>Fusconaia barnesiana</i>	G2G3	S2	SOC		BC	2010-09-15	S
BLUESTONE - CLINCH RIVER - INDIAN CREEK - BIG BRANCH SCU	Vertebrate Animal	Clinch dace	<i>Chrosomus sp. 1</i>	G1	S1	SOC		AC	2007-07-17	

Natural Heritage Resources within Search Radius



Quads: RICHLANDS

Counties: Tazewell

## Richlands WWTP

Company: DEQ-Southwest  
Regional Office  
Lat/Long: 370529/814956

Douglas W. Domenech  
Secretary of Natural Resources

David A. Johnson  
Director



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF CONSERVATION AND RECREATION

The project mapped as part of this report has been searched against the Department of Conservation and Recreation's Biotics Data System for occurrences of natural heritage resources from the area indicated for this project. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics files, NATURAL HERITAGE RESOURCES HAVE BEEN DOCUMENTED within two miles of the indicated project boundaries.

You have submitted this project to DCR for a more detailed review for potential impacts to natural heritage resources. DCR will review the submitted project to identify the specific natural heritage resources in the vicinity of the proposed project. Using the expertise of our biologists, DCR will evaluate whether your specific project is likely to impact these resources, and if so how. DCR's response will indicate whether any negative impacts are likely and, if so, make recommendations to avoid, minimize and/or mitigate these impacts. If the potential negative impacts are to species that are state- or federally-listed as threatened or endangered, DCR will also recommend coordination with the appropriate regulatory agencies: the Virginia Department of Game and Inland Fisheries for state-listed animals, the Virginia Department of Agriculture and Consumer Services for state-listed plants and insects, and the United States Fish and Wildlife Service for federally listed plants and animals. If your project is expected to have positive impacts we will report those to you with recommendations for enhancing these benefits.

Please allow up to 30 days for a response.

We will review the project based on the information you included in the Project Info submittal form, which is included in the report that follows. Often additional information can help us make a more accurate and detailed assessment of a project's potential impacts to natural heritage resources. If you have additional information that you believe will help us better assess your project's potential impacts, you may send that information to us. Please refer to the project Title (from the first page of this report) and include this pdf file with any additional information you send us.

Thank you for submitting your project for review to the Virginia Natural Heritage Program through the NH Data Explorer. Should you have any questions or concerns about DCR, the Data Explorer, or this report, please contact the Natural Heritage Project Review Unit at 804-371-2708.


## Wyatt, Frederick (DEQ)

---

**From:** Wyatt, Frederick (DEQ)  
**Sent:** Wednesday, March 07, 2012 1:38 PM  
**To:** Cason, Gladys (DGIF); 'Cindy\_Kane@fws.gov'  
**Subject:** T&E Coordination for Reissuance of VPDES Permit No. VA0021199 for Richlands Regional Wastewater Treatment Facility  
**Attachments:** doc01024720120307114535.pdf

Attached is the T&E Coordination Form with attachments.

Fred M. Wyatt  
Environmental Engineer Senior  
(276) 676-4810  
email: [Frederick.Wyatt@deq.virginia.gov](mailto:Frederick.Wyatt@deq.virginia.gov)

 <p><b>VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY</b></p>	<p align="center"><b>VPDES PERMITS</b></p> <p align="center"><b>Threatened and Endangered Species Coordination</b></p>
<p><b>To:</b></p> <p>(X) DGIF, Environmental Review Coordinator ( ) DCR (X) USFWS, T/E Review Coordinator</p> <p><b>From: Fred M. Wyatt</b> DEQ, Southwest Regional Office P.O. Box 1688 Abingdon, VA 24212-1688 frederick.wyatt@deq.virginia.gov</p>	<p><b>Date Sent: 03/07/2012</b></p> <p><b>Permit Number: VA0021199</b></p>
<p><b>Facility Name: Richlands Regional Wastewater Treatment Facility</b></p> <p><b>Contact: Timothy Taylor, Town Manager</b></p> <p><b>Phone: (276) 964-2569</b></p> <p><b>Address: Town of Richlands</b> 200 Washington Square Richlands, VA 24641</p>	<p><b>Location: 425 Plant Road, adjacent to Old Richlands Airport</b></p> <p><b>USGS Quadrangle: Richlands, VA</b></p> <p><b>Latitude/Longitude: 37°05'29"/81°49'57"</b></p> <p><b>Receiving Stream: Clinch River</b></p> <p><b>Receiving Stream Flow Statistics used for Permit:</b> 1Q10 Flow = 7.63 MGD 7Q10 Flow = 10.87 MGD 30Q 10 Flow = 14.7 MGD</p> <p><b>Topo Map Attached</b></p>
<p><b>Effluent Characteristics and Max Daily Flow:</b> See attached draft permit pages</p>	<p><b>Species Search Results (or attach database report and map):</b></p> <p>See attached VAFWIS printout</p>

Attach draft permit effluent limits page if available or attach existing effluent limits page (make sure it is clear in your email which one it is – draft current or existing).

DGIF email: [Gladys.Cason@dgif.virginia.gov](mailto:Gladys.Cason@dgif.virginia.gov) USFWS email: [cindy\\_kane@fws.gov](mailto:cindy_kane@fws.gov)

DCR: If Natural Heritage Data Explorer (NHDE) has the needed information DCR does not need this form. If you have additional information you wish to add, you may do so in the comments field on the NHDE form. DCR will contact you directly if they need more information.

# TE Waters Group Clinch River (06010205)

37,05,28.8 -81,49,56.8  
is the Search Point

Display **Item Location** is not at  
in map center

## Show Position Rings

Yes No  
1 mile and 1/4 mile at the  
Search Point

## Show Search Area

Yes No  
2 Search distance miles  
radius

Search Point is at map  
center

## Base Map Choices

Topography

## Map Overlay Choices

Current List: Position, Search,  
Observation

## Map Overlay Legend

### T & E Waters

Federal

Selected Federal

State

Selected State



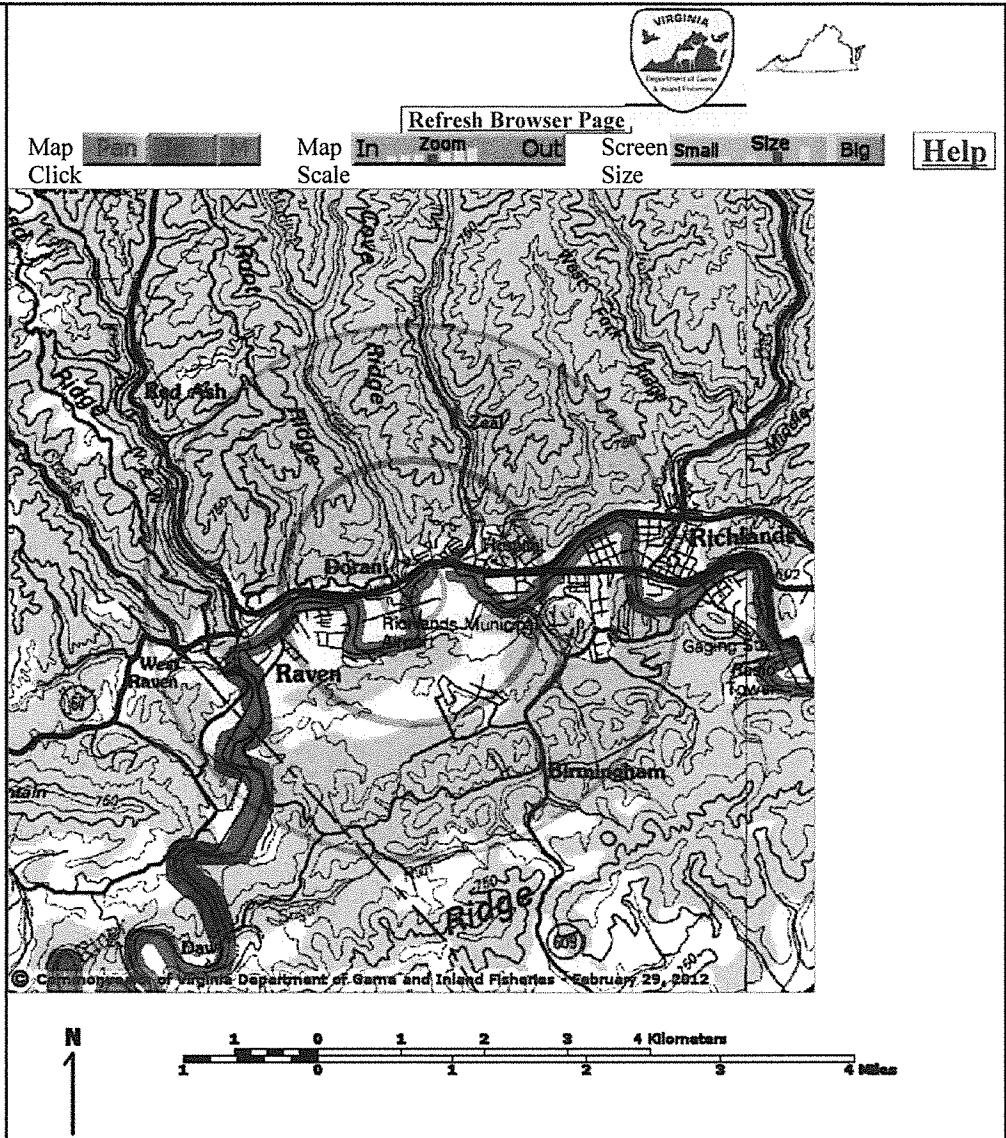
Position Rings  
1 mile and 1/4  
mile at the  
Search Point



2 mile radius  
Search Area



Data  
Observation Site



Point of Search 37,05,28.8 -81,49,56.8

Map Location 37,05,28.8 -81,49,56.8

Select **Coordinate System**: Degrees, Minutes, Seconds Latitude - Longitude  
Decimal Degrees Latitude - Longitude  
Meters UTM NAD83 East North Zone  
Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see [Microsoft terraserver-usa.com](http://microsoft.terraserver-usa.com) for details)

Map projection is UTM Zone 17 NAD 1983 with left 421235 and top 4110147. Pixel size is 16 meters. Coordinates displayed are Degrees, Minutes, Seconds North and West. Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixels. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5 square miles.

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map assembled 2012-02-29 11:29:18 (qa/qc December 1, 2011 15:16 -  
tn=376953.0 dist=3218 I )

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**VaFWIS Initial Project Assessment Report** Compiled on 2/29/2012,  
11:28:54 AM

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Known or likely to occur within a 2 mile radius around point 37,05,28.9 -81,49,56.9  
in 167 Russell County, 185 Tazewell County, VA

[View Map of  
Site Location](#)

511 Known or Likely Species ordered by Status Concern for Conservation  
(displaying first 60) (60 species with Status\* or Tier I\*\* or Tier II\*\* )

<u>BOVA Code</u>	<u>Status*</u>	<u>Tier**</u>	<u>Common Name</u>	<u>Scientific Name</u>	<u>Confirmed</u>	<u>Database(s)</u>
050023	FESE	I	<u>Bat. Indiana</u>	Myotis sodalis		BOVA,HU6
060169	FESE	I	<u>Bean (pearlymussel), Cumberland</u>	Villosa trabalis		BOVA,HU6,Habitat
060147	FESE	I	<u>Bean. purple</u>	Villosa perpurpurea	<u>Yes</u>	BOVA,SppObs,HU6,TEWaters,Habitat
060031	FESE	I	<u>Mussel. oyster</u>	Epioblasma capsaeformis	<u>Yes</u>	BOVA,SppObs,HU6,Habitat
060020	FESE	I	<u>Pearlymussel. birdwing</u>	Conradilla caelata		BOVA
060082	FESE	I	<u>Pearlymussel. cracking</u>	Hemistena lata		BOVA
060094	FESE	I	<u>Pearlymussel. littlewing</u>	Pegias fabula	<u>Yes</u>	BOVA,HU6,TEWaters,Habitat
060051	FESE	I	<u>Pigtoe. finerayed</u>	Fusconaia cuneolus	<u>Yes</u>	BOVA,HU6,TEWaters,Habitat
060052	FESE	I	<u>Pigtoe. shiny</u>	Fusconaia cor	<u>Yes</u>	BOVA,HU6,TEWaters,Habitat
060122	FESE	I	<u>Rabbitsfoot. rough</u>	Quadrula cylindrica strigillata	<u>Yes</u>	BOVA,SppObs,HU6,TEWaters,Habitat
060036	FESE	I	<u>Riffleshell. tan</u>	Epioblasma florentina walkeri	<u>Yes</u>	HU6,TEWaters,Habitat
050021	FESE	II	<u>Bat. gray</u>	Myotis grisescens		HU6
050035	FESE	II	<u>Bat. Virginia big-eared</u>	Corynorhinus townsendii virginianus		BOVA,HU6
010111	FTST	I	<u>Chub. slender</u>	Erimystax cahni	<u>Yes</u>	TEWaters,Habitat
010331	FTST	I	<u>Madtom. yellowfin</u>	Noturus flavipinnis		BOVA,HU6,Habitat
040267	SE	I	<u>Wren. Bewick's</u>	Thryomanes bewickii		BOVA
060080	SE	II	<u>Heelsplitter. Tennessee</u>	Lasmigona holstonia	<u>Yes</u>	BOVA,SppObs,HU6,Habitat

060139	FSSE	II	<u>Lilliput, purple</u>	Toxolasma lividus		BOVA
060007	SE	II	<u>Mussel, slippershell</u>	Alasmidonta viridis	<u>Yes</u>	HU6,TEWaters,Habitat
060174	FSSE	II	<u>Pigtoe, pyramid</u>	Pleurobema rubrum		BOVA
060021	FPSE	II	<u>Spectaclecase</u>	Cumberlandia monodonta	<u>Yes</u>	TEWaters,Habitat
040096	ST	I	<u>Falcon, peregrine</u>	Falco peregrinus		BOVA
040293	ST	I	<u>Shrike, loggerhead</u>	Lanius ludovicianus		BOVA,HU6
010342	ST	II	<u>Darter, sickle</u>	Percina williamsi	<u>Yes</u>	BOVA,HU6,TEWaters,Habitat
040093	FSST	II	<u>Eagle, bald</u>	Haliaeetus leucocephalus		BOVA,HU6
060083	FCST	II	<u>Pearlymussel, slabside</u>	Lexingtonia dolabelloides	<u>Yes</u>	SppObs,HU6,TEWaters,Habitat
010076	ST	III	<u>Shiner, emerald</u>	Notropis atherinoides	<u>Yes</u>	BOVA,TEWaters,Habitat
010335	ST	III	<u>Shiner, steelcolor</u>	Cyprinella whipplei	<u>Yes</u>	BOVA,TEWaters,Habitat
060069	FSST	III	<u>Riversnail, spiny</u>	Io fluvialis	<u>Yes</u>	BOVA,SppObs,HU6,TEWaters,Habitat
060163	ST	IV	<u>Papershell, fragile</u>	Leptodea fragilis		BOVA
060124	ST	IV	<u>Pimpleback</u>	Quadrula pustulosa pustulosa		BOVA
040292	ST		<u>Shrike, migrant loggerhead</u>	Lanius ludovicianus migrans		BOVA
060146	FP	II	<u>Bean, rayed</u>	Villosa fabalis		BOVA
060121	FC	II	<u>Kidneyshell, fluted</u>	Ptychobranchus subtentum	<u>Yes</u>	BOVA,SppObs,HU6,Habitat
010343	FS	I	<u>Darter, ashy</u>	Etheostoma cinereum		BOVA,HU6
080214	FS	I	<u>Stonefly, Beartown perlodid</u>	Isoperla major		BOVA
080226	FS	I	<u>Stonefly, Kosztarab's common</u>	Acroneuria kosztarabi		BOVA
100248	FS	I	<u>Fritillary, regal</u>	Speyeria idalia idalia		BOVA,HU6
010449	FS	II	<u>Dace, Clinch</u>	Chrosomus sp. cf. saylori	<u>Yes</u>	SppObs,HU6,Habitat
010341	FS	II	<u>Logperch, blotchside</u>	Percina burtoni		BOVA,HU6,Habitat

060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana	<u>Yes</u>	BOVA,SppObs,HU6,Habitat
100154	FS	II	<u>Butterfly, Persius duskywing</u>	Erynnis persius persius		BOVA,HU6
010429	FS	III	<u>Sculpin, Bluestone</u>	Cottus sp. 1		BOVA
010428	FS	III	<u>Sculpin, Clinch</u>	Cottus sp. 4		HU6
100001	FS	IV	<u>fritillary, Diana</u>	Speyeria diana		BOVA
020020	CC	II	<u>Hellbender, eastern</u>	Cryptobranchus alleganiensis alleganiensis		BOVA,HU6
030012	CC	IV	<u>Rattlesnake, timber</u>	Crotalus horridus		BOVA
040372		I	<u>Crossbill, red</u>	Loxia curvirostra		BOVA
040225		I	<u>Sapsucker, yellow-bellied</u>	Sphyrapicus varius		BOVA
040319		I	<u>Warbler, black-throated green</u>	Dendroica virens		BOVA
040306		I	<u>Warbler, golden-winged</u>	Vermivora chrysoptera		BOVA,HU6
010075		II	<u>Shiner, popeye</u>	Notropis ariommus		BOVA,HU6,Habitat
020011		II	<u>Frog, mountain chorus</u>	Pseudacris brachyphona		BOVA,Habitat
020030		II	<u>Salamander, green</u>	Aneides aeneus		BOVA,HU6
020081		II	<u>Salamander, southern zigzag</u>	Plethodon ventralis		BOVA
040052		II	<u>Duck, American black</u>	Anas rubripes		BOVA,HU6
040213		II	<u>Owl, northern saw-whet</u>	Aegolius acadicus		BOVA,HU6
040320		II	<u>Warbler, cerulean</u>	Dendroica cerulea		BOVA,HU6
040304		II	<u>Warbler, Swainson's</u>	Limnothlypis swainsonii		BOVA,HU6
040266		II	<u>Wren, winter</u>	Troglodytes troglodytes		BOVA

To view **All 511 species** [View 511](#)

\* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed;  
FC=Federal Candidate; FS=Federal Species of Concern; CC=Collection Concern

\*\* I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

### Anadromous Fish Use Streams

N/A

### Colonial Water Bird Survey

N/A

### Threatened and Endangered Waters ( 2 Reaches )

[View Map of All Threatened and Endangered Waters](#)

Stream Name	T&E Waters Species						View Map
	Highest TE *	BOVA Code, Status *, Tier **, Common & Scientific Name					
<u>Clinch River</u> <u>(06010205)</u>	FESE	010076	ST	III	<u>Shiner, emerald</u>	Notropis atherinoides	Yes
		010111	FTST	I	<u>Chub, slender</u>	Erimystax cahni	
		010332		III	<u>Darter, Tippecanoe</u>	Etheostoma tippecanoe	
		010335	ST	III	<u>Shiner, steelcolor</u>	Cyprinella whipplei	
		010342	ST	II	<u>Darter, sickle</u>	Percina williamsi	
		060007	SE	II	<u>Mussel, slippershell</u>	Alasmidonta viridis	
		060021	FPSE	II	<u>Spectaclecase</u>	Cumberlandia monodonta	
		060051	FESE	I	<u>Pigtoe, finerayed</u>	Fusconaia cuneolus	
		060052	FESE	I	<u>Pigtoe, shiny</u>	Fusconaia cor	
		060069	FSST	III	<u>Riversnail, spiny</u>	Io fluvialis	
		060083	FCST	II	<u>Pearlymussel, slabside</u>	Lexingtonia dolabelloides	
		060094	FESE	I	<u>Pearlymussel, littlewing</u>	Pegias fabula	
		060122	FESE	I	<u>Rabbitsfoot, rough</u>	Quadrula cylindrica strigillata	
		060147	FESE	I	<u>Bean, purple</u>	Villosa perpurpurea	
<u>Clinch River</u> <u>(06010205)</u>	FESE	010342	ST	II	<u>Darter, sickle</u>	Percina williamsi	Yes
		060007	SE	II	<u>Mussel, slippershell</u>	Alasmidonta viridis	
		060036	FESE	I	<u>Riffleshell, tan</u>	Epioblasma florentina walkeri	
		060069	FSST	III	<u>Riversnail, spiny</u>	Io fluvialis	

	060083	FCST	II	<u>Pearlymussel, slabside</u>	Lexingtonia dolabelloides
	060094	FESE	I	<u>Pearlymussel, littlewing</u>	Pegias fabula
	060122	FESE	I	<u>Rabbitsfoot, rough</u>	Quadrula cylindrica strigillata
	060147	FESE	I	<u>Bean, purple</u>	Villosa perpurpurea

**Managed Trout Streams**

N/A

**Bald Eagle Concentration Areas and Roosts**

N/A

**Bald Eagle Nests**

N/A

**Habitat Predicted for Aquatic WAP Tier I & II Species ( 11 Reaches )**View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE *	BOVA Code, Status *, Tier **, Common & Scientific Name					
Big Creek (60102051)	FESE	060007	SE	II	<u>Mussel, slippershell</u>	Alasmidonta viridis	Yes
		060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana	
		060080	SE	II	<u>Heelsplitter, Tennessee</u>	Lasmigona holstonia	
		060147	FESE	I	<u>Bean, purple</u>	Villosa perpurpurea	
Big Creek (60102051)	FESE	060007	SE	II	<u>Mussel, slippershell</u>	Alasmidonta viridis	Yes
		060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana	
		060147	FESE	I	<u>Bean, purple</u>	Villosa perpurpurea	
Clinch River (60102051)	FESE	010075		II	<u>Shiner, popeye</u>	Notropis ariommus	Yes
		010076	ST	III	<u>Shiner, emerald</u>	Notropis atherinoides	
		010111	FTST	I	<u>Chub, slender</u>	Erimystax cahni	
		010331	FTST	I	<u>Madtom, yellowfin</u>	Noturus flavipinnis	

		010332		III	<u>Darter, Tippecanoe</u>	Etheostoma tippecanoe
		010335	ST	III	<u>Shiner, steelcolor</u>	Cyprinella whipplei
		010341	FS	II	<u>Logperch, blotchside</u>	Percina burtoni
		010342	ST	II	<u>Darter, sickle</u>	Percina williamsi
		060007	SE	II	<u>Mussel, slippershell</u>	Alasmidonta viridis
		060021	FPSE	II	<u>Spectaclecase</u>	Cumberlandia monodonta
		060031	FESE	I	<u>Mussel, oyster</u>	Epioblasma capsaeformis
		060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana
		060051	FESE	I	<u>Pigtoe, finerayed</u>	Fusconaia cuneolus
		060052	FESE	I	<u>Pigtoe, shiny</u>	Fusconaia cor
		060069	FSST	III	<u>Riversnail, spiny</u>	Io fluviialis
		060083	FCST	II	<u>Pearlymussel, slabside</u>	Lexingtonia dolabelloides
		060094	FESE	I	<u>Pearlymussel, littlewing</u>	Pegias fabula
		060121	FC	II	<u>Kidneyshell, fluted</u>	Ptychobranchus subtentum
		060122	FESE	I	<u>Rabbitsfoot, rough</u>	Quadrula cylindrica strigillata
		060147	FESE	I	<u>Bean, purple</u>	Villosa perpurpurea
		060169	FESE	I	<u>Bean (pearlymussel), Cumberland</u>	Villosa trabalis
Clinch River (60102051)	FESE	010075		II	<u>Shiner, popeye</u>	Notropis ariommus
		010331	FTST	I	<u>Madtom, yellowfin</u>	Noturus flavipinnis
		010341	FS	II	<u>Logperch, blotchside</u>	Percina burtoni
		010342	ST	II	<u>Darter, sickle</u>	Percina williamsi
		060007	SE	II	<u>Mussel, slippershell</u>	Alasmidonta viridis
		060031	FESE	I	<u>Mussel, oyster</u>	Epioblasma capsaeformis
		060036	FESE	I	<u>Riffleshell, tan</u>	Epioblasma florentina walkeri
		060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana
		060051	FESE	I	<u>Pigtoe, finerayed</u>	Fusconaia cuneolus
		060052	FESE	I	<u>Pigtoe, shiny</u>	Fusconaia cor
		060069	FSST	III	<u>Riversnail, spiny</u>	Io fluviialis

Yes

		060083	FCST	II	<u>Pearlymussel, slabside</u>	Lexingtonia dolabelloides	
		060094	FESE	I	<u>Pearlymussel, littlewing</u>	Pegias fabula	
		060121	FC	II	<u>Kidneyshell, fluted</u>	Ptychobranchus subtentum	
		060122	FESE	I	<u>Rabbitsfoot, rough</u>	Quadrula cylindrica strigillata	
		060147	FESE	I	<u>Bean, purple</u>	Villosa perpurpurea	
(60102051)	FS	060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana	<u>Yes</u>
Coal Creek (60102051)	FS	010449	FS	II	<u>Dace, Clinch</u>	Chrosomus sp. cf. saylori	<u>Yes</u>
Little Town Hill Creek (60102051)	FS	010449	FS	II	<u>Dace, Clinch</u>	Chrosomus sp. cf. saylori	<u>Yes</u>
		060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana	
Little Town Hill Creek (60102051)	FS	010449	FS	II	<u>Dace, Clinch</u>	Chrosomus sp. cf. saylori	<u>Yes</u>
Mudlick Creek (60102051)	FS	010449	FS	II	<u>Dace, Clinch</u>	Chrosomus sp. cf. saylori	<u>Yes</u>
		060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana	
Town Hill Creek (60102051)	FS	010449	FS	II	<u>Dace, Clinch</u>	Chrosomus sp. cf. saylori	<u>Yes</u>
Mill Creek (60102051)	FSSE	060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana	<u>Yes</u>
		060080	SE	II	<u>Heelsplitter, Tennessee</u>	Lasmigona holstonia	
Mill Creek (60102051)	FSSE	060007	SE	II	<u>Mussel, slippershell</u>	Alasmidonta viridis	<u>Yes</u>
		060050	FS	II	<u>Pigtoe, Tennessee</u>	Fusconaia barnesiana	

**Habitat Predicted for Terrestrial WAP Tier I & II Species**

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
020011		II	<u>Frog, mountain chorus</u>	Pseudacris brachyphona	<u>Yes</u>

**Public Holdings:**

N/A

Compiled on 2/29/2012, 11:28:55 AM I376953.0 report=IPA searchType= R dist= 3218 poi= 37,05,28.9 -81,49,56.9

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ATTACHMENT 4  
TMDL Information

# 2010 Impaired Waters

## Category 4 & 5 by Basin and Stream Name\*

### Tennessee and Big Sandy River Basins

Cause Group Code: **P03R-02-BAC - Clinch River**

<b>Location:</b>	The community of Raven is located here and the segment includes the mainstem from just upstream of the Town Hill Creek confluence downstream to the Mill Creek confluence. It also includes the mainstem of the Clinch River from the Mill Creek confluence upstream to Raven-Doran's raw water intake.
<b>City/County</b>	Tazewell Co.
<b>Use(s):</b>	Recreation
<b>Cause(s) / VA Category:</b>	Escherichia coli / 5A, Fecal Coliform / 5A

AWQM stations located at 6BCLN315.11 and 6BCLN321.13 had 25% and 17% exceedances of the E.coli water quality standard.

Assessment Unit	Water name	Location Description	Cause Category	Cause Name	Cycle First Listed	TMDL Schedule	Size
VAS-P03R_CLN01A98	Clinch River	The community of Raven is located in this segment. From the raw water intake just upstream of the Town Hill Creek confluence downstream to the Mill Creek confluence, WQS Section 2.	5A	Escherichia coli	2010	2014	3.10
VAS-P03R_CLN02A00	Clinch River	Clinch River from Raven-Doran's raw water raw water intake upstream to Dry Branch confluence, WQS Section 2b.	5A	Escherichia coli	2004	2016	5.39

#### Clinch River

**Estuary**   **Reservoir**   **River**  
(sq. miles)   (acres)   (miles)

#### Recreation

Escherichia coli / 5A  
Total impaired size by water type: 8.49

Assessment Unit	Water name	Location Description	Cause Category	Cause Name	Cycle First Listed	TMDL Schedule	Size
VAS-P03R_CLN01A98	Clinch River	The community of Raven is located in this segment. From the raw water intake just upstream of the Town Hill Creek confluence downstream to the Mill Creek confluence, WQS Section 2.	5A	Fecal Coliform	2002	2014	3.10

#### Recreation

**Estuary**   **Reservoir**   **River**  
(sq. miles)   (acres)   (miles)

Fecal Coliform / 5A  
Total impaired size by water type: 3.1

#### Sources:

- Source Unknown
- Urban Runoff/Storm Sewers
- Rural (Residential Areas)

\* Narrative descriptions, location and city/county describe the entire extent of the impairment. Sizes may not represent the total size of the impairment.





# 2010 Impaired Waters

## Category 4 & 5 by Basin and Stream Name\*

### Tennessee and Big Sandy River Basins

Cause Group Code: P03R-02-HG - Clinch River

<b>Location:</b>	This segment begins just upstream of the Town Hill confluence and continues downstream to the Mill Creek confluence.
<b>City/County</b>	Tazewell Co.
<b>Use(s):</b>	Fish Consumption
<b>Cause(s) / VA Category:</b>	Mercury in Fish Tissue / 5A

Three fish samples collected in 2007 exceeded the Department of Environmental Quality's screening value for Mercury.

Assessment Unit	Water name	Location Description	Cause Category	Cause Name	Cycle First Listed	TMDL Schedule	Size
VAS-P03R_CLN01A98	Clinch River	The community of Raven is located in this segment. From the raw water intake just upstream of the Town Hill Creek confluence downstream to the Mill Creek confluence, WQS Section 2.	5A	Mercury in Fish Tissue	2010	2022	3.10

#### Clinch River

Estuary (sq. miles)    Reservoir (acres)    River (miles)

#### Fish Consumption

Mercury in Fish Tissue / 5A

Total impaired size by water type:

3.1

#### Sources:

- Source Unknown

\* Narrative descriptions, location and city/county describe the entire extent of the impairment. Sizes may not represent the total size of the impairment.

per 100 milliliters (cfu/100mL). These values are the sums of all the data for each outfall.

The design flow capacity was used for allocation runs. This flow rate was combined with a fecal coliform concentration of 200 cfu per 100 ml to ensure that compliance with state water quality standards could be met even if permitted loads were at maximum levels. The design flow rates and fecal coliform bacteria concentrations are shown in Table C.7.

Nonpoint sources of pollution that were not driven by runoff (*e.g.*, direct deposition of fecal matter to the the stream by wildlife) were modeled similarly to point sources. These sources, as well as land-based sources, are identified in the following sections.

**Table C.8 Flow rates and bacteria loads used to model VADEQ active permits in the Upper Clinch River Watershed study area.**

VADEQ Permit Number	Facility Name	Calibration/Validation				Allocation	
		Flow Rate (MGD)		Bacteria Concentration (cfu/100mL)		Flow Rate (MGD)	Bacteria Concentration (cfu/100mL)
		Min	Max	Min	Max	Design Flow	Fecal Coliform Geometric Mean Standard
VA0021199	Richlands Regional WWTF	1.122	4.413	1.0	27.0	4.00	200
VA0026298	Tazewell WWTP	0.479	2.5	0.0	111.0	2.0	200
VA0065676	Glenrae II Mobile Home Park STP	0.003	0.007	0.0	0.0	0.01	200
VAG*****	Each of 51 domestic Waste Treatment Plants	0.001	0.001	200	200	0.001	200

The number of septic systems in the Upper Clinch River Watershed study area was calculated by overlaying U.S. Census Bureau data (USCB, 1990; USCB, 2000) with the subwatersheds. During allocation runs, the number of households was projected to 2010, based on current growth rates (USCB, 2000) resulting in 3,873 septic systems and 384 straight pipes (Table C.8).

**Table 5.7** Final average annual in-stream *E. coli* bacterial loads (cfu/year) modeled after TMDL allocation in the Upper Clinch River near Richlands impairment.

Impairment	WLA <sup>1</sup> (cfu/yr)	LA (cfu/yr)	MOS	TMDL (cfu/yr)
Clinch River near Richlands	6.29E+13	3.26E+15	<i>Implicit</i>	3.32E+15
VA0026298	3.48E+12			
VA0065676	1.74E+10			
VA0021199	6.97E+12			
VAG400098	1.74E+09			
VAG400092	1.74E+09			
VAG400205	1.74E+09			
VAG400315	1.74E+09			
VAG400360	1.74E+09			
VAG400367	1.74E+09			
VAG400453	1.74E+09			
VAG400509	1.74E+09			
VAG400510	1.74E+09			
VAG400525	1.74E+09			
VAG400591	1.74E+09			
VAG400594	1.74E+09			
VAG400630	1.74E+09			
VAG400636	1.74E+09			
VAG400660	1.74E+09			
VAG400665	1.74E+09			
VAG400786	1.74E+09			
VAG400422	1.74E+09			
VAG400553	1.74E+09			
VAG400606	1.74E+09			
VAG400085	1.74E+09			
VAG400345	1.74E+09			
VAG400401	1.74E+09			
VAG400443	1.74E+09			
VAG400488	1.74E+09			
VAG400498	1.74E+09			
VAG400568	1.74E+09			
VAG400569	1.74E+09			
VAG400653	1.74E+09			
VAG400702	1.74E+09			
VAG400791	1.74E+09			
VAG400806	1.74E+09			
VAG400900	1.74E+09			
VAG400148	1.74E+09			
VAG400306	1.74E+09			
VAG400327	1.74E+09			

<sup>1</sup> The WLA reflects an allocation for potential future permits issued for bacteria control. Any issued permit will include bacteria effluent limits in accordance with applicable permit guidance and will ensure that the discharge meets the applicable numeric water quality criteria for bacteria at the end-of-pipe.

**Table 5.8** Final average daily in-stream *E. coli* bacterial loads (cfu/day) modeled after TMDL allocation in the Upper Clinch River near Richlands impairment.

Impairment	WLA <sup>1</sup> (cfu/day)	LA (cfu/day)	MOS	TMDL (cfu/day)
Clinch River Near Richlands	1.72E+11	7.20E+12	<i>Implicit</i>	7.37E+12
VA0026298	9.55E+09			
VA0065676	4.77E+07			
VA0021199	1.91E+10			
VAG400046	4.77E+06			
VAG400098	4.77E+06			
VAG400092	4.77E+06			
VAG400205	4.77E+06			
VAG400315	4.77E+06			
VAG400360	4.77E+06			
VAG400367	4.77E+06			
VAG400453	4.77E+06			
VAG400509	4.77E+06			
VAG400510	4.77E+06			
VAG400525	4.77E+06			
VAG400591	4.77E+06			
VAG400594	4.77E+06			
VAG400630	4.77E+06			
VAG400636	4.77E+06			
VAG400660	4.77E+06			
VAG400665	4.77E+06			
VAG400786	4.77E+06			
VAG400422	4.77E+06			
VAG400553	4.77E+06			
VAG400606	4.77E+06			
VAG400085	4.77E+06			
VAG400345	4.77E+06			
VAG400401	4.77E+06			
VAG400443	4.77E+06			
VAG400488	4.77E+06			
VAG400498	4.77E+06			
VAG400568	4.77E+06			
VAG400569	4.77E+06			
VAG400653	4.77E+06			
VAG400702	4.77E+06			
VAG400791	4.77E+06			
VAG400806	4.77E+06			
VAG400900	4.77E+06			
VAG400148	4.77E+06			
VAG400306	4.77E+06			
VAG400327	4.77E+06			

<sup>1</sup> The WLA reflects an allocation for potential future permits issued for bacteria control. Any issued permit will include bacteria effluent limits in accordance with applicable permit guidance and will ensure that the discharge meets the applicable numeric water quality criteria for bacteria at the end-of-pipe.

## ATTACHMENT 5

### EPA Check List

**State "Transmittal Checklist" to Assist in Targeting  
Municipal and Industrial Individual NPDES Draft Permits for Review**

**Part I. State Draft Permit Submission Checklist**

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name: Richlands Regional Wastewater Treatment Facility

NPDES Permit Number: VA0021199

Permit Writer Name: Fred M. Wyatt

Date: March 1, 2012

Major ☒ ]Minor ☐ ]Industrial ☐ ]Municipal ☒ ]

**I.A. Draft Permit Package Submittal Includes:**

	Yes	No	N/A
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit– entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?		X	
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?	X		
8. Whole Effluent Toxicity Test summary and analysis?	X		
9. Permit Rating Sheet for new or modified industrial facilities?			X

**I.B. Permit/Facility Characteristics**

	Yes	No	N/A
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet or permit contain a description of the wastewater treatment process?	X		

I.B. Permit/Facility Characteristics– cont.	Yes	No	N/A
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?		X	
6. Does the permit allow the discharge of new or increased loadings of any pollutants?		X	
7. Does the fact sheet or permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?	X		
a. Has a TMDL been developed and approved by EPA for the impaired water?		X	
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?	X		
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?	X		
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		X	
10. Does the permit authorize discharges of storm water?		X	
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?		X	
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?	X		
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	X		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

## Part II. NPDES Draft Permit Checklist

### Region III NPDES Permit Quality Checklist – for POTWs (To be completed and included in the record only for POTWs)

#### II.A. Permit Cover Page/Administration

	Yes	No	N/A
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

#### II.B. Effluent Limits– General Elements

	Yes	No	N/A
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether “antibacksliding” provisions were met for any limits that are less stringent than those in the previous NPDES permit?			X

#### II.C. Technology-Based Effluent Limits (POTWs)

	Yes	No	N/A
1. Does the permit contain numeric limits for <u>ALL</u> of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

#### II.D. Water Quality-Based Effluent Limits

	Yes	No	N/A
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?		X	

<b>II.D. Water Quality-Based Effluent Limits – cont.</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a “reasonable potential” evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the “reasonable potential” evaluation was performed in accordance with the State’s approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing instream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have “reasonable potential”?	X		
d. Does the fact sheet indicate that the “reasonable potential” and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?	X		
e. Does the permit contain numeric effluent limits for all pollutants for which “reasonable potential” was determined?	X		
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an “antidegradation” review was performed in accordance with the State’s approved antidegradation policy?	X		

<b>II.E. Monitoring and Reporting Requirements</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?		X	
4. Does the permit require testing for Whole Effluent Toxicity?	X		

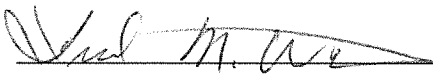
<b>II.F. Special Conditions</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X

II.F. Special Conditions – cont.	Yes	No	N/A
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?	X		
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		X	
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?	X		

II.G. Standard Conditions	Yes	No	N/A
1. Does the <b>permit</b> contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		
<b>List of Standard Conditions – 40 CFR 122.41</b>			
Duty to comply	Property rights	Reporting Requirements	
Duty to reapply	Duty to provide information	Planned change	
Need to halt or reduce activity	Inspections and entry	Anticipated noncompliance	
not a defense	Monitoring and records	Transfers	
Duty to mitigate	Signatory requirement	Monitoring reports	
Proper O & M	Bypass	Compliance schedules	
Permit actions	Upset	24-Hour reporting	
		Other non-compliance	
2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

### Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	<u>Fred M. Wyatt</u>
Title	<u>Environmental Engineer Sr.</u>
Signature	<u></u>
Date	<u>03/01/2012</u>